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FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF PIPELINE AND PRODUCER REGULATION

DOCKET NO. CP79-424

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

CASE NO. U-45957

# ROCKY MOUNTAIN PIPELINE PROJECT

## DRAFT ENVIRONMENTAL IMPACT STATEMENT

**ROCKY MOUNTAIN PIPELINE COMPANY**

JULY 1981

The following counties would be crossed by the Rocky Mountain Pipeline Project, alternatives, and variations.

CALIFORNIA

Alameda, Colusa, Contra Costa, Fresno, Inyo, Kern, Merced, Mono, San Bernardino, San Joaquin, and Stanislaus

IDAHO

Bear Lake, Caribou, Franklin, and Power

NEVADA

Clark, Esmeralda, Lincoln, Mineral, Nye, and White Pine

OREGON

Morrow, Jefferson, Klamath, and Umatilla

UTAH

Beaver, Box Elder, Cache, Garfield, Iron, Juab, Millard, Piute, Rich, Sanpete, Sevier, Summit, Tooele, Utah, Wasatch, and Washington

WYOMING

Lincoln

DRAFT

# ENVIRONMENTAL IMPACT STATEMENT

ON THE

# ROCKY MOUNTAIN PIPELINE PROJECT

July 1981

Ed Hastey

Associate DIRECTOR, BUREAU OF LAND MANAGEMENT

U.S. Department of the Interior
Bureau of Land Management
Office of Special Projects
3rd Floor East
555 Zang Street
Denver, Colorado 80228

Federal Energy Regulatory
Commission
825 North Capitol Street, N.E.
Washington, D.C. 20426

In Reply Refer to:

OPPR/DPC-EEB
Rocky Mountain Pipeline
Company
Docket No. CP79-424

July 10, 1981

TO THE PARTY ADDRESSED:

Copies of the enclosed draft environmental impact statement (DEIS) for the Rocky Mountain Pipeline Project (RMPP) are being sent to you pursuant to the requirements of the National Environmental Policy Act of 1969 and section 2.82(b) of the Federal Energy Regulatory Commission (FERC) "General Policy and Interpretations." The DEIS will be one of the factors used by the FERC in determining whether the proposed project is in the public interest; it will also be one of the factors used by the Bureau of Land Management (BLM), U.S. Department of the Interior (DOI), and the Forest Service (FS), U.S. Department of Agriculture, to determine what right-of-way is in the best interest of the public.

The DEIS, prepared by the staffs of the FERC, BLM, and FS, assesses the potential environmental consequences of the proposed RMPP, a 610-mile long 36-inch diameter pipeline system extending from Lincoln County, Wyoming, into San Bernardino County, California.

The FERC and BLM staffs request public comment on the DEIS. These comments will be used in developing a final environmental impact statement (FEIS). Comments should be received no later than August 24, 1981; they should be mailed to the Secretary, Federal Energy Regulatory Commission, 825 North Capitol Street, N.E., Washington, D.C. 20426. All comments should reference Docket No. CP79-424, Case No. U-45957, and the RMPP DEIS.

Comments should be as specific as possible. They may address the adequacy of the DEIS and the merits of the alternatives discussed within the document. If a commentor is critical of a

methodology that has been used to estimate or predict environmental impact, the reviewer's comment should describe and justify a preferable alternative methodology. Field-level Federal agency and bureau offices which receive this draft should contact their headquarters office to coordinate their comments.

This DEIS has two parts--an analysis of the project and a Graphic Supplement. The DEIS also incorporates by reference a number of documents in accordance with the Council on Environmental Quality regulations. The Graphic Supplement will not be reissued with the FEIS. If changes to the DEIS in response to comments are minor, the comments, responses, and changes to the DEIS may be circulated instead of a completely rewritten environmental impact statement.

Copies of the DEIS have been circulated to Federal, state, and local agencies, to all parties in the FERC proceeding, and to all parties identified in appendix A of the DEIS. It is available for inspection in the FERC's Division of Public Information, Room 1000, in Washington, D.C., at the FERC's San Francisco Regional Office, in the BLM Office of Public Affairs, Washington, D.C., at BLM's Office of Special Projects in Denver, and at the Environmental Protection Agency's Region VIII Office Library at 1860 Lincoln Street, Denver, Colorado, as well as government depository libraries in the region of the project. Finally, the DEIS is available on request from the FERC's Division of Public Information and from the BLM Office of Special Projects in Denver.

BLM will hold four public hearings on the DEIS to receive oral comments. The dates and locations of these hearings are:

| | |
|---|---|
| August 3, 1981 | Showboat Hotel<br>Las Vegas, Nevada |
| August 4, 1981 | University of Southern Utah<br>Old Administration Building<br>Cedar City, Utah |
| August 5, 1981 | Utah County Court House<br>51 South University Street<br>Provo, Utah |
| August 6, 1981 | North Summit Middle School<br>Auditorium<br>Coalville, Utah |

All of these public hearings will begin at 7 p.m. Additional information is given under "Public Hearings Information" in the DEIS.

Any person who desires to present evidence on environmental matters in the FERC proceeding must file with the FERC a petition to intervene pursuant to section 1.8 of the FERC's Rules of

Practice and Procedure (18 CFR § 1.8). Direct testimony concerning environmental matters must be filed in accordance with section 1.26 of the FERC's regulations (18 CFR § 1.26). This testimony shall specify differences with the staff's position and discuss the person's position on the factors set forth in section 2.80 of the FERC's regulations (18 CFR § 2.80).

for Ed Hastey
Robert Burford, Director
Bureau of Land Management
U.S. Department of the
Interior

Kenneth F. Plumb
Kenneth Plumb, Secretary
Federal Energy Regulatory
Commission

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**FEDERAL ENERGY REGULATORY COMMISSION**
Office of Pipeline and Producer Regulation
Washington, D.C. 20426

**BUREAU OF LAND MANAGEMENT**
Office of Special Projects
Denver, Colorado 80228

**Cooperating Agencies**
Bureau of Indian Affairs
Fish and Wildlife Service
U.S. Forest Service
Water and Power Resources Service

# ROCKY MOUNTAIN PIPELINE PROJECT

# DRAFT ENVIRONMENTAL IMPACT STATEMENT

## Rocky Mountain Pipeline Company

| FERC | BLM |
|---|---|
| Docket No. | Case No. |
| CP79-424 | U-45957 |

This Draft Environmental Impact Statement (DEIS) analyzes the environmental effects of the proposed Rocky Mountain Pipeline Project, a 610-mile long 36-inch diameter pipeline system extending from Lincoln County, Wyoming, to San Bernadino County, California. With 31,800 horsepower of compression at one station, this system is designed to transport approximately 413,000 Mcfd of natural gas west and south from the Overthrust region of Colorado, Utah, and Wyoming to California, New Mexico, Arizona, and other western markets.

Comments on this DEIS must be received by August 24, 1981. Anyone desiring to file a petition to intervene with the FERC on the basis of this DEIS should do so in accordance with the requirements of the FERC's rules of Practice and Procedure, 18 CFR Part 1.8 and 1.10.

*For further information contact:*

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Federal Energy Regulatory Commission
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(303) 234-6737

***July 1981***

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# BUREAU OF LAND MANAGEMENT--PUBLIC HEARINGS INFORMATION

Public Hearings on the *ROCKY MOUNTAIN PIPELINE PROJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT* will be held in the following locations:

Las Vegas, Nevada
August 3, 1981

Showboat Hotel
2nd Floor Banquet Room
2800 E. Fremont
Boulder Highway
Las Vegas, Nevada 89104

Cedar City, Utah
August 4, 1981

Southern Utah State College
Old Administration Building
Room 204
351 West Center
Cedar City, Utah 84720

Provo, Utah
August 5, 1981

Utah County Courthouse
South Courtroo
51 South University
Provo, Utah

Coalville, Utah
August 6, 1981

North Summit Middle School Auditorium
Coalville, Utah 84017

Note: Hearings will begin at 7:00 pm.

The hearings will be held pursuant to the objectives of the National Environmental Policy Act (PL 91-190; 83 Stat. 852,853) to receive comments (testimony) on the scope of the EIS and the adequacy of the impact analysis. Testimony presented at these hearings will be considered in the preparation of the final environmental impact statement.

The public hearings will be conducted by a hearings administrator, who will be accompanied by Bureau of Land Management personnel involved in preparing this draft environmental impact statement. The judge and panel members may ask questions of the witness to clarify points in the testimony. All hearing proceedings will be recorded.

Before giving testimony at the public hearing, participants are requested to complete a hearing registration form. *A REGISTRATION FORM IS INCORPORATED AS THE LAST PAGE OF THIS VOLUME.* Additional forms may be obtained from the address shown on the registration form. Registration forms must be returned to that address no later than July 24, 1981. Participants may also register at the registration desk at each hearing.

Time preferences for presentation of oral statements will be honored whenever possible. A tentative listing of speakers, in the order they will be called, will be available at the registration desk at each hearing.

After the last witness has been heard, the hearings administrator will consider the requests of other persons present who wish to testify. Only one witness will be allowed to present the viewpoint of a single organization at any one hearing. However, any witness will be permitted to give relevant testimony if it is offered as the opinion of a private citizen.

Persons wishing to give oral testimony will be limited to 10 minutes. Written submissions may also be presented at the hearing.

# Preface

This Environmental Impact Statement (EIS) presents facts pertaining to the construction, operation, and maintenance of the Rocky Mountain Pipeline Project and any alternatives or variations to this proposed action and analyzes environmental impacts which they cause. It provides pertinent information in sufficient detail for the public to understand the project and for the decisionmaker to make a knowledgeable decision.

The EIS has been prepared according to the requirements of the National Environmental Policy Act of 1969 (NEPA) and the Council on Environmental Quality's regulations for implementing NEPA, effective July 30, 1979. There are six chapters: Five are in the draft EIS; the sixth--containing comments on the draft EIS--will be added for the final EIS. In addition to these chapters, there are appendices containing additional material to supplement information in the EIS chapters and technical reports which contain data supportive to the EIS.

The scoping document, ***PUBLIC IDENTIFICATION OF ISSUES FOR THE ENVIRONMENTAL IMPACT STATEMENT,*** and the technical reports can be obtained from the Bureau of Land Management, Office of Special Projects, Third Floor East, 555 Zang Street, East, Denver, Colorado 80228. They are also available for review at some BLM offices in Utah, Wyoming, Nevada, and California. Technical reports prepared in support of the EIS include the following:

> Cultural Resources Technical Report, Recreation and Wilderness Technical Report, Socioeconomics Technical Report, Soils and Agriculture Technical Report, Terrestrial and Aquatic Biology Technical Report, Threatened and Endangered Species Technical Report, Transportation Networks Technical Report, Visual Resources Technical Report, Water Resources Technical Report.

A list of the groups and individuals receiving copies of this EIS appears in appendix A.

# Summary

The Rocky Mountain Pipeline Project (RMPP) is a 610-mile long natural gas pipeline transmission system. The Rocky Mountain Pipeline Company (RMPC) proposes to construct a 583-mile long, 36-inch diameter interstate pipeline from Lincoln County, Wyoming, to the Nevada-California border in Clark County, Nevada. This pipeline would connect with a new 27-mile long, 36-inch diameter intrastate pipeline proposed by Pacific Gas and Electric Company (PG&E) and Pacific Lighting Service Company. The following map shows the location of the proposed facilities.

RMPC has applied to the Federal Energy Regulatory Commission (FERC) for a certificate of public convenience and necessity to construct the interstate portion of the project and to the U.S. Department of the Interior (DOI), Bureau of Land Management (BLM), for a right-of-way permit to cross 268 miles of Federal land. The California Public Utilities Commission has jurisdiction over the intrastate facilities. This draft environmental impact statement (DEIS) was prepared jointly by the FERC and the BLM with cooperation from the Bureau of Indian Affairs, the Fish and Wildife Service, and the Water and Power Resources Service of the DOI and the Forest Service, U.S. Department of Agriculture.

In addition to the proposed project, numerous alternatives and alignment variations have been evaluated. They include the Northern Systems Alternative, the Sanpete Valley Alternative, the Central Nevada Alternative, the Sevier- Escalante Desert Alternative, the West Salt Lake Alternative, the Provo Canyon Alternative, the Thistle Creek Variation, the East Las Vegas Variation, the Fort Mojave Variation, the Mill Creek Variation, and the Daniels Canyon Variation.

## SUBJECTS OF CONTROVERSY

Several concerns about the RMPP were raised during the public scoping meetings held in August and September 1980. In Las Vegas, the public expressed concern that the proposed route would deleteriously affect the proposed Las Vegas Wash Park and the proposed Rainbow Gardens National Natural Landmark, that the pipeline would be a safety hazard, and that the pipeline would be one more linear right-of-way in an area already heavily utilized without providing any benefits to the local populace.

The Forest Service is concerned that soils impacts in areas covered by Soil Group 1 would be more severe than calculated in the EIS. This topic is under continuing study and any conclusion differences will be in the final EIS.

Another concern which arose during the final preparation of the draft EIS was that the proposed pipeline would traverse agricultural land in Kamas Valley, Utah. The farmers and ranchers prefer to see the pipeline routed around the west edge of the valley.

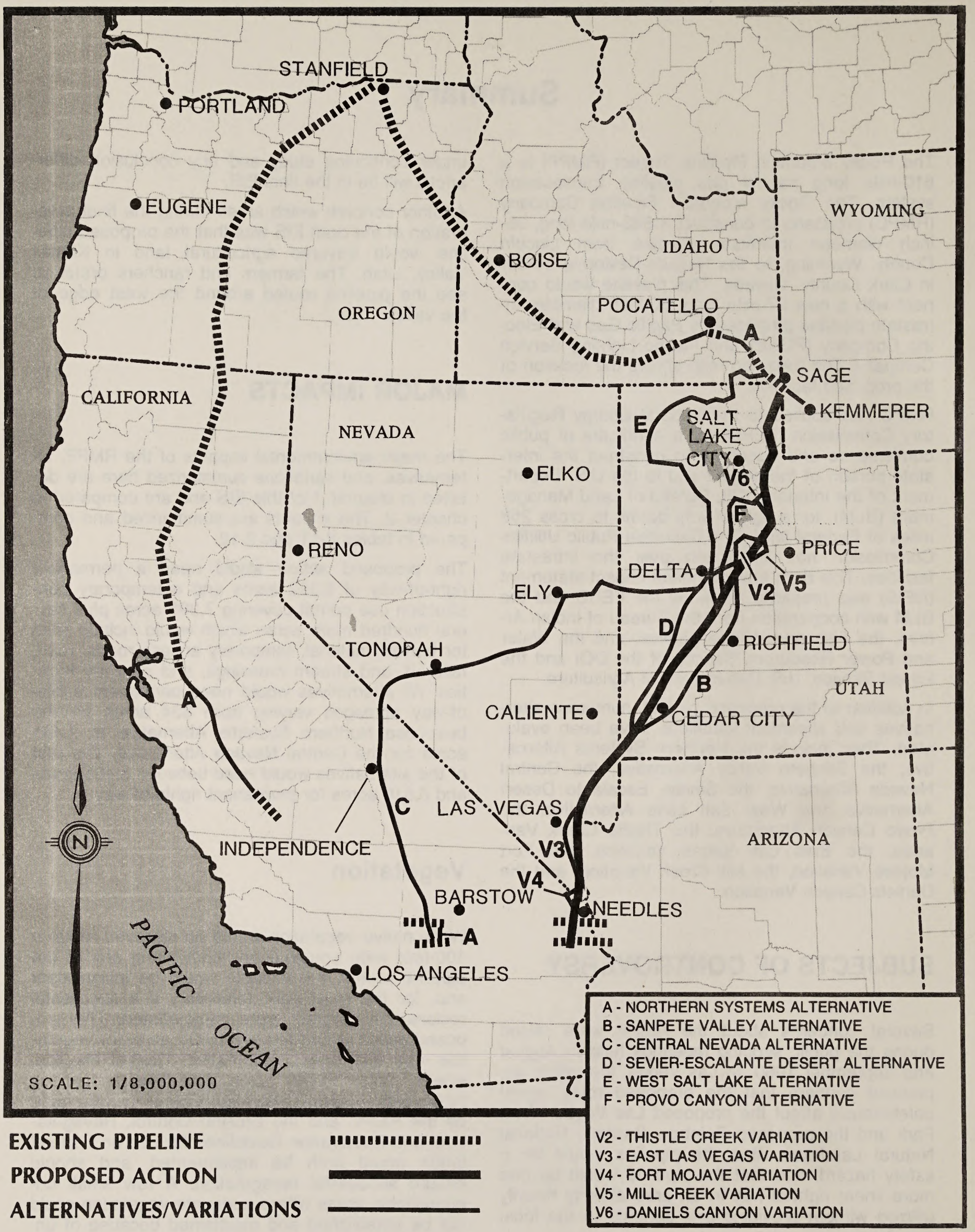
## MAJOR IMPACTS

The major environmental impacts of the RMPP, alternatives, and variations summarized here are detailed in chapter 4 of this EIS and are compared in chapter 2. The impacts are summarized and compared in tables 2-11 and 2-12.

The proposed action would need a permanent right-of-way of 5,392 acres and a temporary construction use permit covering 7,395 acres plus several hundred more acres which would include sites for borrow material, temporary access roads, road, railroad, and stream crossings, and ancillary facilities. All alternatives would need permanent rights-of-way acreages varying from 824 acres for the best-case Northern Systems Alternative to 7,441 acres for the Central Nevada Alternative. The rest of the alternatives would need between 5,405 acres and 6,516 acres for permanent rights-of-way.

### Vegetation

While native vegetation would be removed within a 100-foot wide construction width along any of the pipeline routes, the impacts would be insignificant and, for the most part, temporary if a successful reclamation program were implemented. The proposed action would remove 6,330 acres of vegetation and the longest alternative, Central Nevada, would remove 9,149 acres. The Erosion Control, Revegetation, and Restoration Guidelines proposed by the RMPC and the Erosion Control, Revegetation, and Restoration Guidelines for use on Federal lands would both be implemented, and should ensure successful revegetation. A few small unquantifiable areas where adequate vegetation could not be established and maintained because of unstable soils, would require continuing intensive erosion control measures. Acres of vegetation permanently removed from production would be insignificant for all pipeline routes.




# ROCKY MOUNTAIN PIPELINE PROJECT
## PROPOSED ACTION, ALTERNATIVES, AND VARIATIONS

The proposed action and all alternatives except the best-case Northern Systems Alternative would cross potential habitat of Federal and/or state threatened or endangered plant species, ranging from 2 species along the worst- case Northern Systems Alternative to 16 along the Central Nevada Alternative. The proposed action would cross potential habitat of eight designated plants. Two of the variations--Mill Creek and Daniels Canyon--could also each cross potential habitat of designated plant species. These species are the subject of consultation with the U.S. Fish and Wildlife Service, as required by section 7 of the Endangered Species Act.

## Wildlife

The most direct construction impact on wildife along the pipeline routes would be the clearing of wildlife habitat from the pipeline right-of-way and facility sites. Human presence and activity during construction would also disturb wildlife. All impacts would be temporary, because revegetation would restore the habitat. In the 25-foot widths where trees would not be allowed to regrow over the pipeline, insignificant habitat loss would occur. This would involve 372 acres along the proposed action and up to 869 acres along the Sanpete Valley Alternative.

Two animal species classified as threatened or endangered by either Federal or state governments could be affected by the project. An unquantifiable amount of black-footed ferret habitat and bald eagle habitat could be crossed by the proposed action and all alternatives. The Northern Systems Alternative could also cross habitat of the San Joaquin kit fox and the blunt-nosed leopard lizard. The Central Nevada Alternative could possibly cross the riparian habitat of the Railroad Valley springfish. Section 7 consultation procedures have been initiated for these species. The RMPP would bypass the federally designated critical habitat of the desert tortoise in the Beaver Dam Slope area of Utah, which should not be affected.

## Soils

All pipeline routes would cross acres of soils which are highly susceptible to slides, high erosion hazards, and other limitations associated with project construction and restoration. Acreages would vary from 279 acres along the best-case Northern Systems Alternative to 6,157 acres along the Central Nevada Alternative. The proposed action would cross 3,056 acres of such soils. However, with implementation of the Erosion Control, Revegetation and Restoration Guidelines, all but a few localized areas affected by any of the routes should be successfully stabilized within 1 to 5 years.

## Visual Resources

For all pipeline routes, surface disturbance and removal of vegetation during construction and the addition of structures would affect the visual character of some areas seen by the public. The proposed action would cause significant visual contrasts on 1,209 acres. Alternatives would cause visual contrasts on land ranging from 15 acres for the Northern Systems Alternative (compressor stations and other surface facilities are not analyzed), to 1,538 acres for the Central Nevada Alternative.

## Recreation Resource

Impacts to users of managed recreational sites, trails, rivers, and off- road vehicle event areas would generally be of low significance for all pipeline routes. The proposed action would conflict with four managed areas, and one major ORV event. The alternative pipeline routes would conflict with similar numbers of managed sites, none of high significance.

## Wilderness

The Central Nevada Alternative would have to be rerouted to avoid two BLM Wilderness Study Areas, one in Utah and one in Nevada.

## Agriculture, Grazing, and Forest Resources

All pipeline routes would cross agricultural and grazing lands, and require premature harvest of small amounts of fuel wood and commercial timber. However, the Erosion Control, Revegetation, and Restoration Guidelines proposed by the RMPC would successfully alleviate impacts to agricultural

lands and the amounts of forage and forest products lost would be insignificant.

## Conflicts with Land Use Plan, Controls, and Constraints

The proposed action would conflict with the Utility Corridor Rule of the proposed Forest Land Management Plan for the Uinta National Forest. It would also not follow the over 3,000-foot wide BLM corridor through the expanded Moapa Indian Reservation. The Northern Systems Alternative would not conflict with any known plans or constraints. All of the other alternatives would conflict with one to three plans or constraints; the Central Nevada Alternative would conflict with two proposed plans and one final plan.

## Socioeconomics

Because of the short duration of construction and the small size of the work force relative to the population it would affect, no substantial detrimental effects would occur during construction of the proposed project, the Northern Systems, Sanpete Valley, Sevier-Escalante Desert, West Salt Lake, or Provo Canyon Alternatives or any of the variations. The most significant impact would be the demand for temporary housing such as hotel/motel rooms and campsites, which would be filled to capacity in some locations by construction personnel. Although this would inconvenience other travelers and campers, it would last less than 6 months.

Housing demand would be more substantial for the Central Nevada Alternative. Depending on the progress of the MX missile system and other developments in central Nevada, work camps might be required to house RMPP construction personnel. If so, the demand on local fire protection would increase, as would the demand for water and sewerage.

Balancing the inconvenience caused by the housing demand would be minor increases in retail trade and employment. Substantial long-term increases in county property tax revenues would occur in a number of the counties where the proposed or alternative facilities would be located.

The operations work force for any of the alternatives or variations would be very small compared to the population it would affect and would therefore have no significant beneficial or detrimental effects.

## Cultural Resources

All pipeline routes would cross some lands containing cultural resources of high site density and high site significance. However, the magnitude of potential impact cannot be determined until a site-specific inventory and evaluation is conducted for areas delineated by the appropriate State Historic Preservation Officers. Because of compliance procedures outlined in a draft Memorandum of Agreement between the BLM, the Advisory Council on Historic Preservation, and the appropriate State Historic Preservation Officers, impacts should not be numerous or highly significant.

## Geology and Topography

The geology of the region would not be affected by the proposed action or its alternatives and variations. Although the impact of geologic hazards to the project would be significant, it generally would not coincide with populated areas. The exception would be at Nephi, Utah, where the RMPP would cross the active Wasatch fault. Safety impact would be significantly reduced if the fault-crossing technique recommended in chapter 5 were implemented.

Permanent modification of the topography would be caused by constructing portions of the proposed action and some of the alternatives and variations, notably the Provo Canyon Alternative and Daniels Canyon Variation. Topographic constraints on construction and congestion in narrow canyons would occur along the RMPP, the Provo Canyon Alternative, and the Daniels Canyon Variation.

## Water Resources

The only water resources which would be affected by any of the pipeline routes would be streams which would be crossed. Such impacts would be minimized by proposed construction methods, and only small amounts of sediment would be transported a short distance downstream.

## Air Quality

Construction of the RMPP, alternatives, or variations would temporarily increase fugitive dust and gaseous pollutants; however, no long-term impact would occur from operation of construction vehicles. Short-term violations of all national ambient air

quality standards might occur. Operation of the compressor station(s) for the RMPP and alternatives would increase pollutant concentrations near the proposed and/or existing sources. However, the increase in ground-level concentrations of pollutants would not exceed the national standards.

## Noise

Temporary noise in excess of a sound pressure level of 55 dB(A) caused by construction would affect local residents along the right-of-way. These impacts would be short and occur during daylight hours. The existing noise environment adjacent to the proposed and modified compressor stations would be degraded to a minor extent.

A recommendation in this impact statement would require that the applicant design all new compressor stations so that a day-night sound pressure level of 55 dB(A) would not be exceeded at the nearest existing noise receptor. This value would be in accordance with the U.S. Environmental Protection Agency's long-term goal. A potential increase of 3 dB(A) could be expected if the horsepower at any existing compressor station was doubled using similar units. However, this increase would not be a significant impact.

## Pipeline Safety

The natural gas pipeline would be designed and operated in accordance with all U.S. Department of Transporation regulations. If a pipeline ruptured, RMPC would isolate and shut in the rupture as soon as possible to minimize the potential volume of gas lost. The operation of the natural gas pipeline would not pose a significant risk to the health and safety of the public.

## Energy Efficiency

The amount of energy consumed (incremental fuel) during transportation of the proposed 413,000-Mcfd gas volume would vary according to the alternative. The analysis comparing the efficiency of the alternatives is based on the percentage of the gas volume delivered to California versus the initial project volume. The analysis indicates the following efficiencies:

| Transmission System | Energy Efficiency |
|---|---|
| RMPP, Sanpete Valley, Sevier-Escalante Desert, and Provo Canyon Alternatives, All Variations | 99.3 percent |
| West Salt Lake Alternative | 99.2 percent |
| Central Nevada Alternative | 99.1 percent |
| Northern Systems Alternative (Prebuilt Western Leg) | 95.9 percent |
| Northern System Alternative (Completed Western Leg) | 93.3 percent |

Because the fuel requirements to transport 90,000 Mcfd south from Sumas, Washington, to Sage, Wyoming, on Northwest's system are unavailable, the efficiencies for the RMPP and the Sanpete Valley, Central Nevada, Sevier- Escalante Desert, West Salt Lake, and Provo Canyon Alternatives reflect the most positive possibility. On the other hand, the fuel efficiency of the Northern Systems Alternative for both the prebuilt and completed Western Leg phases could improve if Canadian imports decrease after 1982 or demand for gas diminishes when gas prices are deregulated.

# ISSUES TO BE RESOLVED

The FERC must determine (1) if there is a need for the proposed action and (2) if the RMPP is the preferred transportation system to deliver gas from the Rocky Mountain region to California and nearby western markets. The BLM and Forest Service must determine (1) what the most appropriate right-of-way for the RMPP would be if the FERC certificates a project and, (2) what specific mitigation would be necessary on Federal lands.

One of the resource issues to be resolved involves continuing study to determine how severe potential impacts would be to mountainous soils in Utah. Two more issues concern the recent requests for additional alternatives, one to bypass Kamas Valley, requested by the Kamas Valley Soil Conservation District and the other, a route to place the pipeline within the 3,000-foot wide corridor through the newly expanded Moapa Indian Reservation.

Both alternatives are anticipated to be included in the final EIS.

## FERC ENVIRONMENTAL STAFF CONCLUSIONS

The RMPP and the Northern Systems Alternative are both environmentally acceptable transportation systems for delivering gas to California and nearby markets. However, although it would be less energy efficient than the RMPP, the Northern Systems Alternative is a *SIGNIFICANTLY SUPERIOR* alternative because it would require less pipeline construction, be completely constructed near or adjacent to existing pipeline rights-of-way, and be constructed as the facilities are needed.

## LAND MANAGING AGENCIES' PREFERRED ALTERNATIVE

The Department of the Interior land managing agencies have found that the proposed route is acceptable and reasonable, with the substitution of the following variations: Variation 2, Thistle Creek or Variation 5, Mill Creek, if Variation 2 is not possible, Variation 6, Daniels Canyon. Variation 3, East Las Vegas and Variation 4, Fort Mojave are both acceptable if the use permits and rights-of-way cannot be obtained from the City of Henderson and Clark County and the Fort Mojave Indian Reservation.

The U.S. Forest Service, Department of Agriculture, along with FERC, finds the Northern Systems Alternative to be environmental preferrable. This is also acceptable and reasonable to the Department of the Interior land managing agencies.

# Chapter 1

# Purpose of and Need for Proposed Action

The Rocky Mountain Pipeline Project (RMPP) is a proposed interstate natural gas transmission system which would extend 583 miles from the vicinity of Sage, Wyoming, through Utah to near Searchlight, Nevada. The pipeline would be owned and operated by the Rocky Mountain Pipeline Company (RMPC) for the sole purpose of transporting natural gas. It would have a proposed minimum useful life of 20 years. The RMPC would be a general partnership cosponsored by Pacific Gas Transmission Company (PGT), El Paso Natural Gas Company (El Paso), Pacific Interstate Transmission Company (PIT), and Northwest Pipeline Corporation (Northwest), with the partners owning 35-, 30-, 25-, and 10-percent interests, respectively. (See appendix A for more detailed information on the corporate structure.) At the Nevada-California border, the RMPP would connect with 27 miles of intrastate facilities to be constructed by Pacific Gas and Electric Company (PG&E), which would deliver the gas to the existing transmission systems of PG&E, Southern California Gas Company (SoCal), and Pacific Lighting Service Company (PLS) in California. Consequently, a total of about 610 miles of pipeline would be required to implement the proposed project.

The primary purpose of the project is to transport natural gas and to provide gas consumers in California and the southwestern United States with direct and economical new supplies of natural gas from the central Rocky Mountain region. The proposed project could also provide natural gas to communities along the pipeline route in Utah and Nevada and stimulate new exploration and development of gas reserves. The RMPP would provide a system for supplying natural gas to U.S. consumers from the Overthrust Belt and other producing areas in the Rocky Mountains, the Hingeline area of central and southern Utah, and other sources of supply that may be developed, such as those in Canada.

Gas exploration and development in the Rocky Mountains, particularly in the Overthrust Belt near the northern end of the proposed project, have increased significantly in recent years. In 1981, the U.S. Geological Survey (USGS) estimated that the undiscovered recoverable gas resources in the Rocky Mountains and northern Great Plains range from 29.6 to 69 trillion cubic feet of gas. The applicant has indicated that the Potential Gas Agency, a private organization, estimated probable, possible, and speculative gas supply from the Overthrust Belt as 23, 45, and 49 trillion cubic feet, respectively

The RMPC would not own the natural gas it transports. It proposes only to transport natural gas for the project sponsors but would also consider transportation of gas for other shippers. El Paso, Pacific Transmission Supply Company (PTS), a subsidiary of PGT, and Natural Gas Corporation of California (NGC), a subsidiary of PG&E, are exploring for and developing new gas supplies. They would contract to transport their Rocky Mountain gas through the proposed pipeline. El Paso would use the proposed facility to obtain additional gas supply, while Northwest initially plans to use it to deliver gas from its existing system supply for sale to unspecified customers.

NGC, PTS, and El Paso have developed proved supplies, working interests, and rights to purchase gas in Montana, Wyoming, Utah, Idaho, and Colorado. At this time, Northwest intends to sell 30,000 thousand cubic feet per day (Mcfd) from its system supply to one of the other project sponsors for shipment through the RMPP; El Paso intends to commit 60,000 Mcfd to the project through 1989 from Canadian gas supplies that it is seeking to acquire. The applicant has not identified any other gas supply commitments to support the proposed 413,000 Mcfd project, and no gas supply is under formal contract.

Northwest, PGT, NGC, and PTS have also concluded a letter of agreement that would allow Northwest to transport 100,000 Mcfd until the RMPP had built up sufficient gas transportation contracts to justify its construction. This agreement would allow gas that is currently available to be moved to market and should help to stimulate continued exploration and development of gas reserves in the region. Northwest would have to deliver the 100,000 Mcfd to PGT and/or El Paso for transportation to California markets. A similar transportation agreement may have to be obtained from El Paso before the Northwest-PGT-NGC-PTS interim transportation arrangement could be used. El Paso has indicated that it can transport additional volumes of Rocky Mountain gas on a best-efforts basis. If completed, this transportation arrangement would continue to be used even if the proposed project is authorized.

PG&E, SoCal, and El Paso have indicated that their gas supplies from traditional sources are declining and that they need new sources of supply. The Rocky Mountain gas could help satisfy this need and reduce future curtailment on their systems. Table 1-1 summarizes these companies' projected need for new gas supplies. They allege that natural gas sources within California are being depleted. El Paso, which supplies approximately 50 percent of the gas used in California, has curtailed service to its customers almost continually since 1972. Canadian gas supplies for consumers in California are subject to export permits which contain expiration dates. Consequently, RMPC states that new sources of gas supply are needed to meet the energy needs of PG&E's 2.7 million gas customers, SoCal's 3.7 million customers, and El Paso's market east of California. All of these markets currently have unsatisfied demand (PG&E *et al.* 1979). See appendix B for information on how the total natural gas reserves within the United States have been declining.

TABLE 1-1

ANNUAL CURTAILMENT FORECAST FOR AVERAGE TEMPERATURE YEARS

| Year | [a]PG&E | | [b]SoCal & PLS | | [c]El Paso | |
|---|---|---|---|---|---|---|
| | [d]Percent | [e]Billion cubic feet | Percent | Billion cubic feet | Percent | Billion cubic feet |
| 1979[f] | 15.7 | 158 | 66 | 443 | 26.0 | 93 |
| 1980 | 12.7 | 122 | 68 | 418 | 18.4 | [g]59 |
| 1981 | 14.6 | 136 | 74 | 345 | 19.4 | 60 |
| 1982 | 17.0 | 151 | 71 | 369 | 31.1 | 100 |
| 1983 | 15.5 | 133 | 70 | 369 | 31.2 | 99 |
| 1984 | 14.2 | 118 | 67 | 419 | 35.1 | 112 |
| 1985 | 14.9 | 125 | 61 | 519 | 38.5 | 124 |
| 1986 | 23.5 | 204 | 67 | 445 | 43.0 | 138 |
| 1987 | 26.8 | 237 | 69 | 421 | 55.4 | 178 |
| 1988 | 37.2 | 334 | 62 | 530 | 65.0 | 208 |
| 1989 | 45.3 | 403 | 60 | 571 | 68.5 | 222 |
| 1990 | 52.9 | 459 | 57 | 608 | 71.9 | 230 |

Source: Exhibit I, FERC Docket No. CP79-424-001.

[a]PG&E estimates are based on the assumption that only traditional sources of gas are available.

[b]SoCal and PLS estimates are based on systemwide growth requirements along with decline of traditional sources and ongoing efforts to procure new gas supplies.

[c]El Paso estimates for markets east of California do not include supplies from the RMPP. El Paso also provides PG&E, SoCal, and other gas companies with gas and would curtail their purchases.

[d]This percentage represents the amount of gas that is not available on the system.

[e]Actual amount of gas that could have been used if it had been available--i.e., the amount by which demand exceeded supply.

[f]Actual curtailment level experienced on all systems.

[g]Reflects 6 months of actual data and 6 months of forecast data on El Paso's System.

In addition to the proposed project, PG&E and SoCal are actively seeking to purchase additional gas supplies for California from other gas producing regions of the United States and Indonesia. Pacific Alaska LNG Associates and Western LNG Terminal Associates have proposed liquefied natural gas (LNG) projects that could initially deliver 400,000 and 500,000 Mcfd of gas, respectively, to California if they become operational (FERC Docket Nos. CP75- 140 *et al.* and CP74-160 *et al.*). PGT and PG&E have also been designated by President Carter to construct and operate the Western Leg of the Alaska Natural Gas Transportation System (ANGTS). This Alaskan pipeline system, when completed, will provide California and other western markets with access to new supplies of gas from Alaska's North Slope (about 640,000 Mcfd). Before Alaskan gas is available, the Western Leg may transport Canadian gas for a limited time. Synthetic natural gas from coal and methanization of animal waste and garbage are also potential sources of gas supply. All of these options could provide California with additional sources of supply which would help to meet the energy needs of the region.

Furthermore, the Federal Energy Regulatory Commission (FERC) environmental staff notes that if the RMPP delivers additional supplies of natural gas to California, this cleaner burning energy could be used instead of oil or other hydrocarbon fuels. (One thousand cubic feet of gas is equivalent to about 7.194 gallons of No. 2 fuel oil.) Natural gas supplies from the Rocky Mountain area delivered to California and the Southwest could displace potential oil imports and reduce reliance on alternative fuels.

The main source of gas for the RMPP would be the Rocky Mountain area. Several projects have been proposed to move Rocky Mountain area gas to eastern and western markets. Among these were the Cities Service Gas Company (Cities) proposal (FERC Docket No. CP76-500) and the Wyoming Interstate Natural Gas System (WINGS) proposal (FERC Docket No. CP78-99). Cities has been authorized by the FERC to operate a 613-mile long pipeline from Sweetwater County, Wyoming, to Harvey County, Kansas. The maximum capacity of this recently constructed pipeline is 185,000 Mcfd.

Although the Cities proposal was approved, it was conditioned so that the company, not the ratepayers, will bear the cost if projected gas supply does not materialize. The original WINGS proposal was modified eliminating all proposed facilities in favor of using the existing Colorado Interstate Gas Company (CIG) system. The FERC certificate provides for transportation services between North-

west and CIG and between Michigan-Wisconsin Pipeline Company and CIG. Initial deliveries, using the spare capacity of the existing systems to move the gas, would range up to 25,000 Mcfd. New facilities would be constructed as needed. New gas supplies remote from one company's transmission systems could be moved immediately by a shipper company with existing facilities in the area. In addition, CIG has received certification increasing the capacity of a portion of its system east of Rock Springs, Wyoming, by 161,365 Mcfd (FERC Docket No. CP80-40).

Trailblazer Pipeline Company *et al.* proposes to transport 617,400 Mcfd of gas to markets in the West, Midwest, and East using connections with other transmission systems (FERC Docket No. CP79-80,et al.). The Trailblazer Project is the subject of an FERC final environmental impact statement (FEIS) published in September 1980. The Trailblazer system has not been considered as an environmental alternative to the RMPP because it would serve a different market and the applicants for both projects claim that different sources of supply would be tapped. If this assertion should prove invalid and/or gas supply data should show that only one of these major projects can be supported, these proposals might become alternatives to each other for transporting gas from the Rocky Mountain region.

An additional project, related in that Overthrust area gas could be involved, is the Trans-Anadarko Pipeline System (Trans-Anadarko) proposal (FERC Docket No. CP80-17-002). According to this proposal, Trans-Anadarko could receive up to 285,000 Mcfd of gas from the Overthrust Belt through the CIG, Mountain Fuel Supply Company (Mountain Fuel) and other transmission systems. On September 4, 1980, the FERC issued a Notice of Intent to Prepare an EIS on the Trans-Anadarko Project and requested comments on its scope.

Numerous companies are competing for gas supplies in the Rocky Mountain region and have either increased the capacity of their existing transmission systems, proposed to expand their systems, or proposed new pipelines to transport gas from the region. This will affect the ability of the RMPC to obtain enough gas transportation agreements to support its project. As with these other projects, the need for the proposed facilities, market for the gas supply, gas supply issues, and other matters related to the public convenience and necessity are being fully examined by other technical staff members of the FERC and will be the subject of formal FERC proceedings. Under section 7(c) of the Natural Gas Act and its implementing regulations, the FERC has sole responsibility for determining that interstate natural gas transportation facilities are in the public interest. If the FERC determines that there is or will be a need for a proposed service, it will issue a certificate of public convenience and necessity that authorizes the RMPP. Until the FERC makes a decision based on a fully developed record, the need for the proposed project has not been established.

# Chapter 2

# Proposed Action and Alternatives

## BACKGROUND

On July 31, 1979, PGT filed an application with the FERC under section 7 of the Natural Gas Act (Docket No. CP79-424) for a certificate of public convenience and necessity authorizing the construction and operation of the RMPP, a 694.8-mile long interstate pipeline transmission system. This pipeline, which would have connected with Northwest's existing pipeline system at two locations in the central Rocky Mountains, would transport natural gas to PG&E in California. PG&E would have had to construct 40 miles of pipeline to connect the RMPP with its existing intrastate facilities in California. (All facilities within California are considered intrastate facilities under the jurisdiction of the California Public Utilities Commission (CPUC) and not under the jurisdiction of the FERC.)

On June 6, 1980, PGT and PG&E filed a consolidation application with the Secretary of the Department of the Interior (DOI) pursuant to section 28 of the Mineral Leasing Act of 1920, as amended, for grants of right-of-way for the proposed facilities on Federal lands. This application was assigned Case No. U-45957.

On September 8, 1980, RMPC filed an amendment to PGT's application in Docket No. CP79-424 and to the PGT filing for a right-of-way grant with the DOI, Case No. U-45957. With this amendment, RMPC now proposes to construct and operate a 583-mile long interstate pipeline transmission system from Sage, Wyoming, through Utah and Nevada, to the Nevada-California border near Searchlight, Nevada. At this point, the RMPP would connect with a 27-mile long intrastate pipeline to be constructed by PG&E, which would deliver the gas to the existing transmission systems of PG&E, SoCal, and PLS in California.

PG&E and PLS would jointly own the pipeline and will submit a separate filing to the CPUC for the 27-mile long segment and a separate application to the Bureau of Land Management (BLM), DOI, for the right-of-way grant across BLM-administered lands in California. Approximately 12 of these 27 miles are already part of a pipeline right-of-way grant to SoCal from the BLM issued June 4, 1980. (This right-of-way extends between the North and South Needles Compressor Stations.) These intrastate facilities would cost about $25,550,000 (June 1980 dollars).

The RMPC proposes to transport volumes of natural gas tendered by shippers on a contract basis. Under the proposal, the applicant would provide only a transportation service with its facilities; it would not own any of the gas that it hauls.

The RMPP would have an initial capacity of 413,000 Mcfd on an annual average day basis. (Figure 2-1 shows the design of the proposed facilities.) RMPC facilities would cost about $514,908,000 (second quarter 1980 dollars). The applicant has also indicated that the proposed project could be expanded to an optimized capacity of 800,000 Mcfd, but it has no plans to do so at this time.

To complete this transportation system, Northwest would have to construct and operate facilities to interconnect its existing facilities to those of the RMPC. One meter station and 0.18 mile of 36-inch diameter pipeline would be necessary to accomplish this. (See figure 2-1 for these facilities.)

Therefore, a total of 610.18 miles of pipeline would be constructed. Map 2-1 and the maps in the *Graphic Supplement* identify the location of the proposed facilities. This EIS analyzes the entire pipeline system; it will identify the system as the RMPP.

On March 6, 1980, the FERC published a notice in the *Federal Register* indicating that it was preparing an EIS evaluating the proposed RMPP and asked for comments on the scope of the EIS. Four individuals and 10 state and Federal agencies responded.

After the applicant filed an application with the DOI, the BLM and the FERC agreed to act as joint lead agencies responsible for preparing the EIS for the RMPP. BLM published notices in the *Federal Register* on August 22, 1980, and October 5, 1980, indicating that BLM and FERC were preparing a joint EIS on the project and that scoping meetings would be held. The Bureau of Indian Affairs (BIA), Water and Power Resources Service (WPRS), and the Fish and Wildlife Service (FWS), all within the DOI, and the Forest Service (FS), U.S. Department of Agriculture, are also participating as cooperating agencies.

Seven scoping meetings have been held to determine the issues that the public believes should be addressed in this EIS. These meetings were held in the following locations: Salt Lake City, September 15, 1980; Cedar City, Utah, September 16; Las Vegas, September 17; Needles, California, Septem-

PSIA Pounds Per Square Inch Absolute

°F Degrees Fahrenheit

" Inches

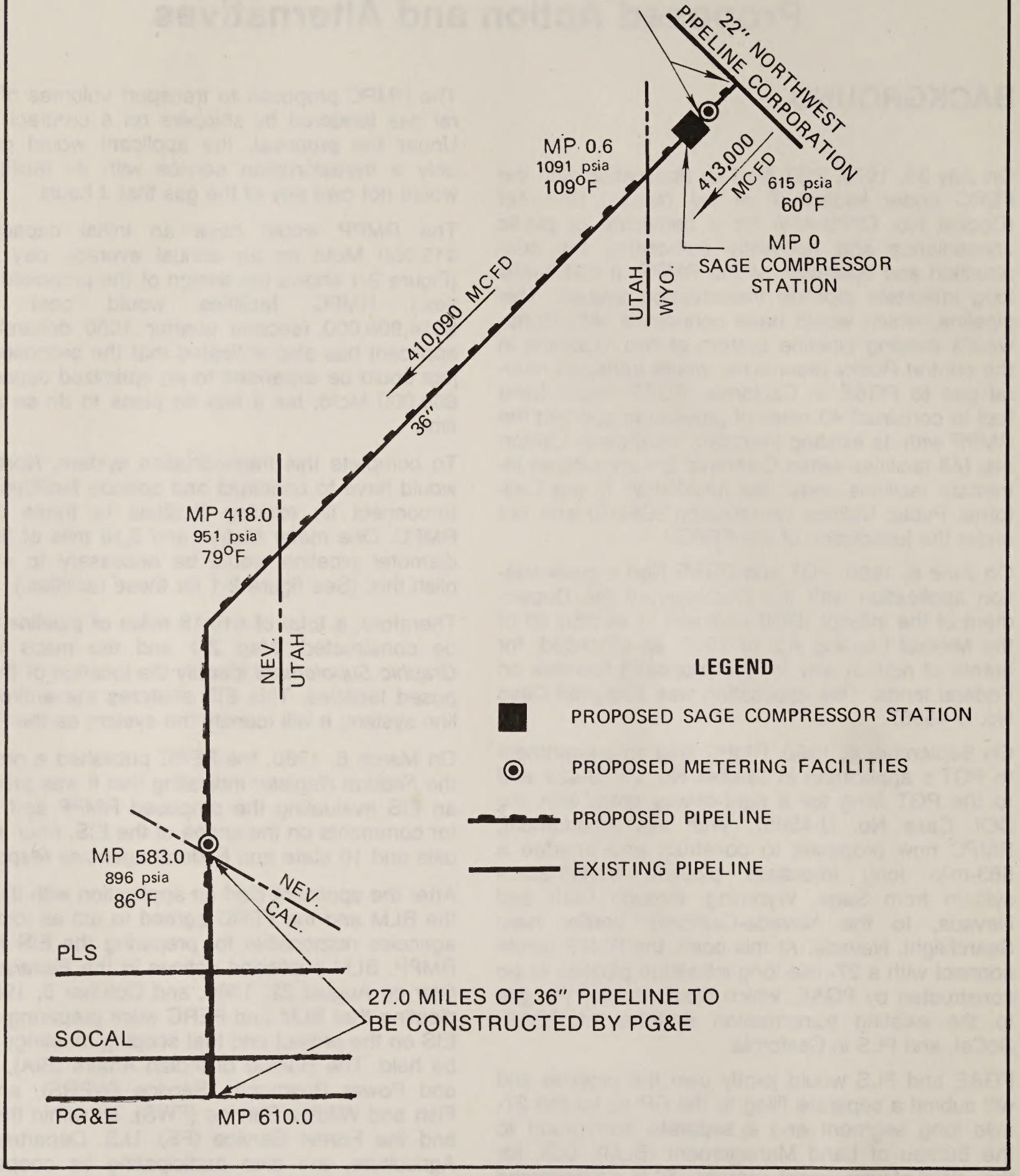
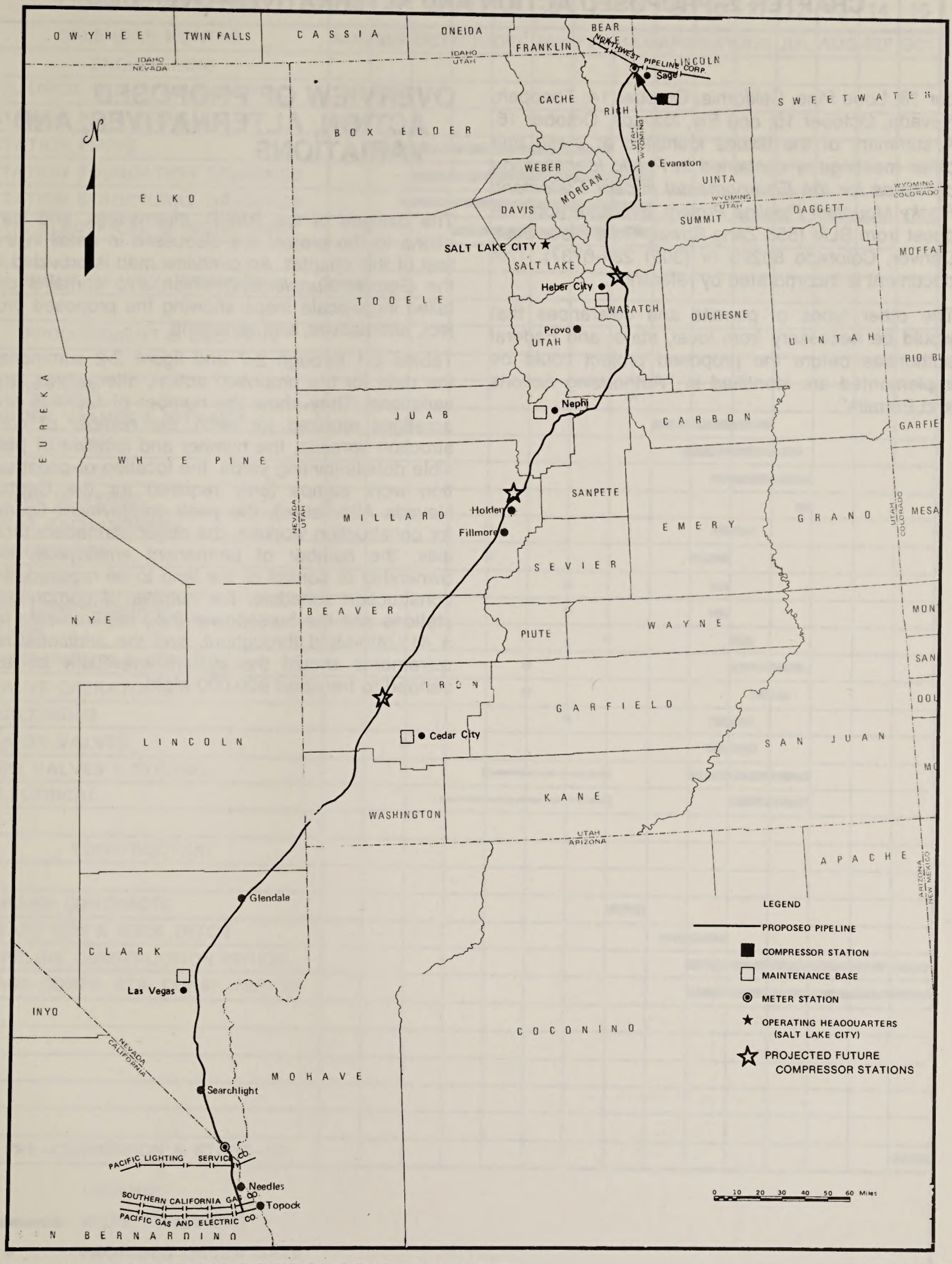



FIGURE 2-1. FLOW DIAGRAM FOR THE PROPOSED PROJECT




MAP 2-1. LOCATION OF PROPOSED FACILITIES

ber 18; Lone Pine, California, October 14; Tonopah, Nevada, October 15; and Ely, Nevada, October 16. A summary of the issues identified at these and other meetings is contained in *Public Identification of Issues for the Environmental Impact Statement: Rocky Mountain Pipeline Project*, available upon request from BLM (555 Zang Street, Third Floor East, Denver, Colorado 80228 or (303) 234-6737). This document is incorporated by reference.

The other types of permits and clearances that would be necessary from local, state, and Federal authorities before the proposed project could be implemented are identified in "Authorizing Actions and Permits".

## OVERVIEW OF PROPOSED ACTION, ALTERNATIVES, AND VARIATIONS

The designs of the RMPP, alternatives, and variations to the project are discussed in detail in the rest of this chapter. An overview map is provided in the *Graphic Supplement*, which also contains detailed large-scale maps showing the proposed project, alternatives, and variations.

Tables 2-1 through 2-7 and figure 2-2 summarize the data for the proposed action, alternatives, and variations. They show the number of facilities and acreages required for each, the number of construction spreads, the number and location of possible double-jointing yards, the location of construction work camps (only required for the Central Nevada Alternative), the peak employment figures for construction workers, the major permanent facilities, the number of permanent employees, the ownership or control of the land to be crossed, the construction schedule, the number of compressor stations and the horsepower (hp.) requirements for a 413,000-Mcfd throughput, and the additional requirements should the system eventually be expanded to transport 800,000 Mcfd.

| | PROJECT MONTHS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CALENDAR MONTHS | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT |
| | ENGINEERING | | | | | | | | | | | | | | | |
| 1 | P/L DWGS. & BILL OF MATERIAL | | | | | | | | | | | | | | | |
| 2 | STATION PLOT PLANS | | | | | | | | | | | | | | | |
| 3 | STATION PIPING | | | | | | | | | | | | | | | |
| 4 | STATION FOUNDATION DRAWINGS | | | | | | | | | | | | | | | |
| 5 | STATION STRUCTURAL DRAWINGS | | | | | | | | | | | | | | | |
| 6 | STA. ELECTRICAL & INSTR. DWGS. | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | RIGHT OF WAY–PERMITTING | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | PROCUREMENT & DELIVERY | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 1 | ORDER PIPE | | | | | | | | | | | | | | | |
| 2 | ORDER VALVES & FITTINGS | | | | | | | | | | | | | | | |
| 3 | PIPE ROLLING | | | | | | | | | | | | | | | |
| 4 | PIPE SHIPMENT | | | | | | | | | | | | | | | |
| 5 | PRIME MOVER(S) | | | | | | | | | | | | | | | |
| 6 | HEAT EXCHANGER(S) | | | | | | | | | | | | | | | |
| 7 | SCRUBBER(S) | | | | | | | | | | | | | | | |
| 8 | VESSEL(S) | | | | | | | | | | | | | | | |
| 9 | AIR COMPRESSOR(S) | | | | | | | | | | | | | | | |
| 10 | PUMPS | | | | | | | | | | | | | | | |
| 11 | INSTRUMENTS & CONTROLS | | | | | | | | | | | | | | | |
| 12 | VALVE OPERATOR(S) | | | | | | | | | | | | | | | |
| 13 | BUILDING(S) | | | | | | | | | | | | | | | |
| 14 | MAJOR VALVES | | | | | | | | | | | | | | | |
| 15 | PIPE VALVES & FITTINGS | | | | | | | | | | | | | | | |
| 16 | ELECTRICAL | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | CONSTRUCTION | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 1 | AWARD CONTRACTS | | | | | | | | | | | | | | | |
| 2 | START R/W & ROCK DITCH | | | | | | | | | | | | | | | |
| 3 | PIPELINE CONSTRUCTION PERIOD | | | | | | | | | | | | | | | |
| 4 | SAGE COMPR. STA. CONST. PERIOD | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | |
| | PRE–COMMISSION & START–UP | | | | | | | | | | | | | | | |

LEGEND

WORK FUNCTIONS

PROPOSED ORDER DATE

PROPOSED ORDER PERIOD

FIGURE 2-2. PROPOSED PROJECT CONSTRUCTION SCHEDULE

FIGURE 5-5: PROPOSED PROJECT CONSTRUCTION SCHEDULE

TABLE 2-1.

FACILITIES AND COMPONENTS

| | Proposed Action | Alternative A, Northern Systems | | Alternative B, Sanpete Valley | Alternative C, Central Nevada | Alternative D, Sevier-Escalante Desert | Alternative E, West Salt Lake | Alternative F, Provo Canyon | Variation 2, Thistle Creek | Variation 3, East Las Vegas | Variation 4, Fort Mojave | Variation 5, Mill Creek | Variation 6, Daniels Canyon |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Worst | Best | | | | | | | | | | |
| **FACILITIES** | | | | | | | | | | | | | |
| Total Length (Miles) | [a]610.18 | [a]225.1 | [a]76.8 | 630 | 862 | 622 | 747 | 619 | 617 | 614 | 610 | 618 | 614 |
| Length of Alternative (Miles) | NA | 225.1 | 76.8 | 200 | 666 | 182 | 392 | 115 | 27(20) | 59(56) | 10(10) | 21(13) | 52(48) |
| Number of Compressor Stations/Operating Horsepower | [b]21,200 | [c]21,600 | [c]21,600 | [b]21,200 | [b]25,650 | [b]21,200 | [d]23,350 | [b]21,200 | NA | NA | NA | NA | NA |
| Number of Meter Stations | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | NA | NA | NA | NA | NA |
| Number of Maintenance Bases | 5 | [e]0 | [e]0 | 5 | 7 | 5 | 6 | 5 | NA | NA | NA | NA | NA |
| Number of Block Valves | 34 | [f]6 | [f]UNK | 34 | [g]43 | 34 | [g]37 | 34 | NA | NA | NA | NA | NA |
| Number of Cathodic Protection Stations | 15 | [h]7 | [h]3 | 15 | [h]19 | 15 | [i]50 | 15 | NA | NA | NA | NA | NA |
| **LAND REQUIREMENTS** | | | | | | | | | | | | | |
| Construction ROW[j] | 7,395 | 2,728 | 931 | 7,636 | 10,447 | 7,539 | 9,054 | 7,502 | 327(242) | 715(679) | 121(121) | 254(158) | 630(582) |
| Extra Construction Requirements Acres[k] | 185 | [l]100 | [l]60 | 186 | 272 | 186 | 236 | 185 | NA | NA | NA | NA | NA |
| Borrow Sites (Acres)[m] | 60 | UNK | UNK | 60 | 85 | 61 | [n]2,100 | 60 | NA | NA | NA | NA | NA |
| Temporary Access Roads (Acres) | UNK | UNK | UNK | UNK | UNK | UNK | UNK | UNK | NA | NA | NA | NA | NA |
| Permanent ROW (Acres)[o] | 5,511 | 2,619 | 824 | 5,635 | 7,441 | 5,405 | 6,516 | 5,750 | 291(199) | 485(362) | 73(61) | 164(148) | 467(411) |
| Permanent Access Roads (Acres) | 21 | UNK | UNK | UNK | UNK | UNK | UNK | UNK | NA | NA | NA | NA | NA |
| Compressor Stations (Acres) | 15 | [p]15 | [p]15 | 15 | 15 | 15 | 15 | 15 | NA | NA | NA | NA | NA |
| Meter Stations (Acres)[q] | 1 | [r]1 | [r]0 | 1 | 1 | 1 | [s]1 | 1 | NA | NA | NA | NA | NA |
| Maintenance Bases (Acres)[t] | 20 | [e]0 | [e]0 | 20 | 30 | 20 | 20 | 20 | NA | NA | NA | NA | NA |
| Block Valves (Acres)[u] | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Cathodic Protection Station (Acres)[v] | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

NOTE: Figures in parentheses show data for segment of proposed action which variation replaces.

Due to the relatively short length of the variations, all other facility and land requirements would be essentially the same as the proposed action.

NA - Not Applicable

UNK - Unknown

[a] - Although the mileage has been shown to the decimal point, this number has been rounded for calculating acres of impact to resources.

[b] - A 10,600-hp. spare compressor unit would also be installed at the Sage Compressor Station.

[c] - This compression would be located at the Stanfield, Ione, Madras, Bonanza, and Delevan Compressor Stations instead of at the Sage Compressor Station.
[d] - This compressor would be located at Montpelier Compresssor Station, not at Sage.
[e] - Based on the assumption that existing maintenance bases oculd be utilized for this alternative.
[f] - Includes block valve requirements on Brentwood-Panoche Junction pipeline based on valve spacing of one block valve every 20 miles. Information Northwest pipeline looping and Hinkley-Adelanto pipeline is not available.
[g] - Based on block valve spacing of one block valve every 20 miles.
[h] - Based on spacing of one cathodic protection station every 45 miles.
[i] - For West Salt Lake Alternative, extra cathodic protection would be required.
[j] - Assuming 100-foot wide right-of-way for construction.
[k] - Includes construction acreage requirements for double jointing yards and known road, railroad, and stream crossings. Additional acreages could be needed as more is known about requirements.
[l] - Requirements for double-jointing yards only.
[m] - Borrow site acreage assumed to be proportional to total pipeline length unless stated otherwise.
[n] - More fill material would be required on this alternative due to the extreme instability and saline nature of the soil.
[o] - 100-foot wide permanent right-of-way across state and private lands; 50-foot wide right-of-way across Federal lands.
[p] - Fifteen acres for new compressor station at Stanfield, Oregon. Compression increase at four additional compressor stations would utilize the site for any additional facilities.
[q] - One acre for the Nevada/California meter station. Northwest's meter station would be at the Sage Compressor Station, unless noted otherwise.
[r] - One acre for the Hinkley Meter Station. Stanfield Meter Station would be located either at the existing meter station or at the new Stanfield Compressor Station.
[s] - One meter station at the Nevada/California border and one at Montpelier Compressor Station.
[t] - 5 acres each for maintenance bases at Heber City, Nephi, Cedar City, and Las Vegas. The maintenace base at Sage would not require any additional land because it would be located on the proposed compressor station site.
[u] - 10- by 20-foot fenced site for each block valve, not including access roads. Since block valves would be in or adjacent to the right-of-way, little additional land would be required.
[v] - 20 feet by 20 feet for each cathodic protection site, not including access roads. Since sites would be located on or adjacent to in the right-of-way, little additional land would be required.

## TABLE 2-2

## PIPELINE SPREADS AND CONSTRUCTION WORK CAMPS

| | Proposed Action | Alternative A, Northern Systems | Alternative B, Sanpete Valley | Alternative C, Central Nevada | Alternative D, Sevier-Escalante Desert | Alternative E, West Salt Lake | Alternative F, Provo Canyon |
|---|---|---|---|---|---|---|---|
| Spreads No. & Location | 1 MP 0-100<br>2 100-180<br>3 180-300<br>4 300-400<br>5 400-500<br>6 500-583<br>7 583-610 | 1 *0-22*<br>1 *34-41*<br>1 *66-89*<br>1 *143-168*<br>2 *0-120*<br>2 *0-23* | 1 MP 0-100<br>2 100-176<br>3 0-100*<br>4 *100-180*<br>5 *180-400*<br>6 400-500<br>7 500-583<br>8 583-610 | 1 MP 0-100<br>2 100-196<br>3 *0-110*<br>4 *110-220*<br>5 *220-330*<br>6 *330-444*<br>7 *444-564*<br>8 *564-666* | 1 MP 0-100<br>2 100-196<br>3 *0-100*<br>4 *100-180*<br>5 180-400<br>6 400-500<br>7 500-583<br>8 583-610 | 1 MP *0-22*<br>1 *34-41*<br>1 *0-80*<br>2 *80-200*<br>3 *200-300*<br>4 *300-280*<br>5 280-400<br>6 400-500<br>7 500-583<br>8 583-610 | 1 MP0-100<br>2 00-110<br>3 *110-300*<br>4 300-400<br>5 400-500<br>6 500-583<br>7 583-610 |
| Double Jointing Yard No.& Location | 1 Evanston, WY<br>2Provo, UT<br>3 Nephi, UT<br>4 Fillmore, UT<br>5 Cedar City, UT<br>6 Las Vegas, NV<br>7 Boulder City, NV<br>8 Needles, CA | 1 Kemmerer, WY<br>2 Soda Springs, ID<br>3 Pocatello, ID<br>4 Antioch, CA<br>5 Volta, CA | 1 Evanston, WY<br>2 Provo, UT<br>3 Nephi, UT<br>4 Richfield, UT<br>5 Cedar City, NV<br>6 Las Vegas, NV<br>7 Boulder City, NV<br>8 Needles, CA | 1 Evanston, WY<br>2 Provo, UT<br>3 Nephi, UT<br>4 Ely, NV<br>5 Currant, NV<br>6 Tonopah, NV<br>7 Benton, NV<br>8 Big Pine, CA<br>9 Lone Pine, CA<br>10 Inyokern, CA<br>11 Adelanco, CA | 1 Evanston, WY<br>2 Provo, UT<br>3 Nephi, UT<br>4 Milford, UT<br>5 Cedar City, UT<br>6 Las Vegas, NV<br>7 Boulder City, NV<br>8 Needles, CA | 1 Montpelier, ID WY<br>2 Tremonton, UT<br>3 Lucin, UT<br>4 Knolls, UT<br>5 Delta, UT<br>6 Cedar City, UT<br>7 Las Vegas, NV<br>8 Boulder City, NV<br>9 Needles, CA | 1 Evanston, WY<br>2 Provo, UT<br>3 Nephi, UT<br>4 Fillmore, UT<br>5 Cedar City, UT<br>6 Las Vegas, NV<br>7 Boulder City, NV<br>8 Needles, CA |
| Construction Work | N.A. | N.A. | N.A. | 1 Delta, UT | N.A. | N.A. | N.A. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Camp | | | | 2 Ely, NV<br>3 Currant, NV<br>4 Tonopah, NV<br>5 Bishop, CA<br>6 Inyokern, CA | | | |

N.A. - Not Applicable

* - For the alternatives; spreads are located using a combination of proposed action mileposts and alternative mileposts. Mileposts preceded or followed by asterisks are mileposts along alternatives which are numbered from 0 at the point where the alternative leaves the proposed action see the *Graphics Supplement* for routes and mileposts.

[a]Northern Systems Alternative Spread No. 1

[b]Northern Sytems Alternative Spread No. 2

TABLE 2-3

CONSTRUCTION PEAK EMPLOYMENT (Number of Workers)

| | Proposed Action | Alternative A, Northern Systems | Alternative B, Sanpete Valley | Alternative C, Central Nevada | Alternative D, Sevier-Escalante Desert | Alternative E, West Salt Lake | Alternative F, Provo Canyon |
|---|---|---|---|---|---|---|---|
| Compressor Station | 100 | [a]300 | 100 | 100 | 100 | 100 | 100 |
| Pipeline Spread 1 | 320 | 320 | 320 | 320 | 320 | 320 | 320 |
| Pipeline Spread 2 | 320 | 290 | 320 | 320 | 320 | 290 | 320 |
| Pipeline Spread 3 | 320 | NA | 320 | 320 | 320 | 290 | 320 |
| Pipeline Spread 4 | 320 | NA | 320 | 320 | 320 | 290 | 320 |
| Pipeline Spread 5 | 320 | NA | 320 | 320 | 320 | 320 | 320 |
| Pipeline Spread 6 | 320 | NA | 320 | 290 | 320 | 320 | 320 |
| Pipeline Spread 7 | 290 | NA | 380 | 290 | 320 | 320 | 290 |
| Pipeline Spread 8 | 0 | NA | 290 | 290 | 290 | 290 | NA |

Double Jointing Yards: 67 persons per yard; each pipeline spread would have at least one double jointing yard.

NA - Not Applicable

[a]Five compressor stations at Stanfield, Ione, Madras, and Bonanza, Oregon, and Delevan, California. Construction would occur over an unknown period of time.

TABLE 2-4.

MAJOR NEW ABOVEGROUND FACILITIES

| Proposed Action | Alternative A, Northern Systems | Alternative B, Sanpete Valley | Alternative C, Central Nevada | Alternative D, Sevier-Escalante Desert | Alternative E, West Salt Lake | Alternative F, Provo Canyon |
|---|---|---|---|---|---|---|
| Salt Lake City Headquarters | [1]NONE | Salt Lake City Headquarters | Salt Lake City Headquarters | Salt Lake City Headquarters | Salt Lake City Headquarters | Salt Lake City Headquarters |
| Sage Compressor Station, Maintanance Base, and Meter Station | Stanfield Compressor Station and Meter Station | Sage Compressor Station, Maintenance Base, and Meter Station | Sage Compressor Station, Maintenance Base, and Meter Station | Sage Compressor Station, Maintenance Base, and Meter Station | Montpelier Compressor Station, Maintenance Base, and Meter Station | Sage Compressor Station, Maintenance Base, and Meter Station |
| Heber City Maintenance Base | Hinkley Meter Station | Heber City Maintenance Base | Heber City Maintenance Base | Heber City Maintenance Base | Lucin Maintenance Base | Heber City Maintenance Base |
| Nephi Maintenance Base | | Nephi Maintenance Base | Nephi Maintenance Base | Nephi Maintenance Base | Dugway Maintenance Base | Nephi Maintenance Base |
| Cedar City Maintenance Base | | Cedar City Maintenance Base | Ely Maintenance Base | Cedar City Maintenance Base | Cedar City Maintenance Base | Cedar City Maintenance Base |
| Las Vegas Maintenance Base | | Las Vegas Maintenance Base | Nevada / California Stateline Meter Station | Las Vegas Maintenance Base | Las Vegas Maintenance Base | Las Vegas Maintenance Base |
| Nevada / California Stateline Meter Station | | Nevada / California Stateline Meter Station | Tonopah Maintenance Base<br>Bishop Maintenance Base<br>Inyokern Maintenance Base | Nevada / California Stateline Meter Station | Nevada / California Stateline Meter Station | Nevada / California Stateline Meter Station |

[1]There will be no new operating headquarters for the Northern Systems Alternative; existing maintenance bases will be used.

TABLE 2-5

PERMANENT EMPLOYMENT (Number of Workers)

| Route | Facilities Required | Number of Employees |
|---|---|---|
| Proposed Action | Salt Lake City (Headquarters) | 27 |
| | Sage Compressor Station and Maintenance Base | 12 |
| | Heber City Maintenance | 7 |
| | Nephi Maintenance Base | 7 |
| | Cedar City Maintenance Base | 8 |
| | Las Vegas Maintenance Base | 7 |
| | TOTAL | 68 |
| Alternative A, Northern Systems | Stanfield Compressor Station | 5 |
| | TOTAL | 5 |
| Alternative B, Sanpete Valley | Salt Lake City (Headquarters) | 27 |
| | Sage Compressor Station and Maintenance Base | 12 |
| | Heber City Maintenance Base | 7 |
| | Nephi Maintenance Base | 7 |
| | Cedar City Maintenance Base | 8 |
| | Las Vegas Maintenance Base | 7 |
| | TOTAL | 68 |
| Alternative C, Central Nevada | Salt Lake City (Headquarters) | 27 |
| | Sage Compressor Station and Maintenance Base | 12 |
| | Heber City Maintenance Base | 7 |
| | Nephi Maintenance Base | 7 |
| | Ely Maintenance Base | 7 |
| | Tonopah Maintenance Base | 7 |
| | Bishop Maintenance Base | 7 |
| | Inyokern Maintenance | 7 |
| | TOTAL | 81 |
| Alternative D, Sevier-Escalante Desert | Salt Lake City (Headquarters) | 27 |
| | Sage Compressor Station and Maintenance Base | 12 |
| | Heber City Maintenance Base | 7 |
| | Nephi Maintenance Base | 7 |
| | Cedar City Maintenance Base | 8 |
| | Las Vegas Maintenance Base | 7 |
| | TOTAL | 68 |
| Alternative E, West Salt Lake | Salt Lake City (Headquarters) | 27 |
| | Montpelier Compressor Station and Maintenance Base | 12 |
| | Lucin Maintenance Base | 7 |
| | Dugway Maintenance Base | 7 |
| | Cedar City Maintenance Base | 8 |
| | Las Vegas Maintenance Base | 7 |
| | TOTAL | 68 |
| Alternative F, Provo Canyon | Salt Lake City (Headquarters) | 27 |
| | Sage Compressor Station and Maintenance Base | 12 |
| | Heber City Maintenance Base | 7 |
| | Nephi Maintenance Base | 7 |
| | Cedar City Maintenance Base | 8 |
| | Las Vegas Maintenance Base | 7 |
| | TOTAL | 68 |

TABLE 2-6.

LAND STATUS (Miles of Land Crossed)

| | Proposed Action | Alternative A, Northern Systems | | Alternative B, Sanpete Valley | Alternative C, Central Nevada | Alternative D, Sevier-Escalante Desert | Alternative E, West Salt Lake | Alternative F, Provo Canyon | Variation 2, Thistle Creek | Variation 3, East Las Vegas | Variation 4, Fort Mojave | Variation 5, Mill Creek | Variation 6, Daniels Canyon |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Best | Worst | | | | | | | | | | |
| Wyoming | | | | | | | | | | | | | |
| BLM | 0 | 13 | 13 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 |
| FS | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| State | 0 | 1 | 1 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 |
| Private | 0.8 | 2 | 2 | 0.8 | 0.8 | 0.8 | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Utah | | | | | | | | | | | | | |
| BLM | 102 | 0 | 0 | 103 | 105 | 125 | 248 | 105 | 0 | 0 | 0 | 0 | 0 |
| FS | 50 | 0 | 0 | 49 | 32 | 49 | 17 | 17 | 6 | 0 | 0 | 15 | 27 |
| State | 12 | 2 | 2 | 10 | 10 | 25 | 25 | 19 | 1 | 0 | 0 | 0 | 2 |
| Private | 236 | 3 | 3 | 268 | 171 | 213 | 189 | 279 | 21 | 0 | 0 | 6 | 13 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| WPRS[a] | 19 | 0 | 0 | 9 | 19 | 19 | 0 | 8 | 0 | 0 | 0 | 0 | 0 |
| Nevada | | | | | | | | | | | | | |
| BLM | 150 | 0 | 0 | 150 | 218 | 150 | 150 | 150 | 0 | 38 | 8 | 0 | 0 |
| FS | 1 | 0 | 0 | 1 | 31 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| State | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Private | 5 | 0 | 0 | 0 | 41 | 5 | 5 | 5 | 0 | 20 | 2 | 0 | 0 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| WPRS | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| BIA[b] | 7 | 0 | 0 | 7 | 0 | 7 | 7 | 7 | 0 | 0 | 0 | 0 | 0 |
| California | | | | | | | | | | | | | |
| BLM | 9 | 0 | 0 | 9 | 93 | 9 | 9 | 9 | 0 | 0 | 8 | 0 | 0 |
| FS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| State | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Private | 14 | 148 | 0 | 14 | 142 | 14 | 14 | 14 | 0 | 0 | 2 | 0 | 0 |
| BIA | 4 | 0 | 0 | 4 | 0 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 0 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Idaho | | | | | | | | | | | | | |
| BLM | 0 | 5 | 5 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| FS | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 |
| State | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Private | 0 | 48 | 48 | 0 | 0 | 0 | 48 | 0 | 0 | 0 | 0 | 0 | 0 |
| BIA | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 610.8 | 77 | 225 | 630 | 862 | 622 | 747 | 619 | 27 | 59 | 10 | 21 | 52 |

NOTE: This table provides a guide to the general land ownership along the routes. Land ownership has been rounded off and could include a three percent differential. The totals have also been rounded. The exact land ownership cannot be determined because the route is defined as a corridor.

[a]Includes lands around Strawberry Reservoir withdrawn from FS to WPRS, but which are still under overall FS administration.

[b]Nevada total of BIA includes Moapa Indian lands even though maps do not show same.

TABLE 2-7.

COMPRESSOR STATIONS AND HORSEPOWER REQUIRED FOR TWO PIPELINE CAPACITIES, PROPOSED AND POTENTIAL EXPANSION

| | 413,000 Mcfd Compressor Station | HP | 800,000 Mcfd Compressor Station | HP |
|---|---|---|---|---|
| Proposed Action | Sage Compressor Station | 21,200[b] | Sage Compressor Station | 53,000 |
| | | ..... | MP 104.1 | 10,600 |
| | | ..... | MP 229.5 | 10,600 |
| | | ..... | MP 349.5 | 10,600 |
| Alternative A, Northern Systems | Stanfield Compressor Station | 400 | Stanfield Compressor Station | 4,050 |
| | Ione Compressor Station | 8,975 | Lava Hot Springs Compressor Station | 2,100 |
| | Madras Compressor Station | 1,450 | Burley Compressor Station | 1,950 |
| | Bonanza Compressor Station | 1,375 | Mountain Home Compressor Station | 400 |

TABLE 2-7.—Continued

| | 413,000 Mcfd Compressor Station | HP | 800,000 Mcfd Compressor Station | HP |
|---|---|---|---|---|
| | Delevan Compressor Station | 8,750 | Ione Compressor Station | 24,500 |
| | | ..... | Kent Compressor Station | 7,250 |
| | | ..... | Madras Compressor Station | 14,650 |
| | | ..... | Paulina Compressor Station | 11,200 |
| | | ..... | Diamond Junction Compressor Station | 8,000 |
| | | ..... | Bonanza Compressor Station | 18,420 |
| | | ..... | Tionesta Compressor Station | 5,250 |
| | | ..... | Burney Compressor Station | 7,250 |
| | | ..... | Gerber Compressor Station | 9,450 |
| | | ..... | Delevan Compressor Station | 18,980 |
| Alternative B, Sanpete Valley | Sage Compressor Station | [b]21,200 | [a]NA | ..... |
| Alternative C, Central Nevada | Sage Compressor Station | 25,650 | Sage Compressor Station | 52,400 |
| | | ..... | MP 210.0 | 22,850 |
| | | ..... | MP 420.0 | 25,650 |
| | | ..... | MP 614.0 | 19,300 |
| Alternative D, Sevier-Escalante Desert | Sage Compressor Station | [b]21,200 | [a]NA | ..... |
| Alternative E, West Salt Lake | Montpelier Compressor Station | 23,350 | Montpelier Compressor Station | 52,400 |
| | | ..... | MP 190.2 | 18,800 |
| | | ..... | MP 380.2 | 19,200 |
| | | ..... | MP 570.2 | 9,050 |
| Alternative F, Provo Canyon | Sage Compressor Station | [b]21,200 | [a]NA | ..... |

Variations 2 through 6 would be similar to the proposed action.

Notes: NA - Not Available

[a]Although data is not available, requirements should be similar to those of the proposed action

[b]One additional 10,600 horsepower spare compressor unit would be installed.

# PROPOSED ACTION

## Facilities

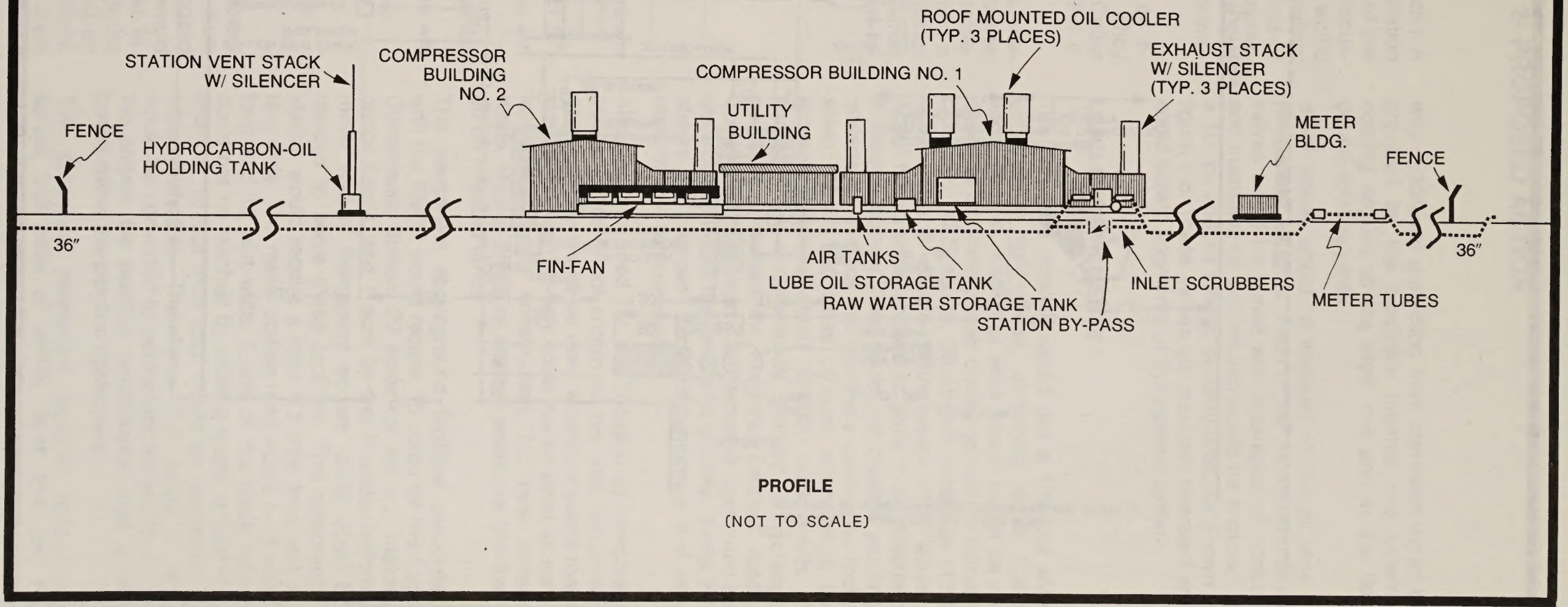
### COMPONENTS

The major components of the proposed pipeline system would be segments of 36-inch diameter pipeline totalling 610.18 miles, one 31,800-hp. compressor station, 2 meter stations, 5 maintenance bases, 34 block valves, 15 cathodic protection stations, and a communication system. (See map 2-1 for the general location of these facilities. The *Graphic Supplement* provides detailed maps of the proposed project.) The RMPC headquarters and facility for the remote control of the system would be located in Salt Lake City. Table 2-1 lists the permanent and temporary land requirements of the project.

Northwest would construct 0.18 mile of 36-inch diameter pipeline from its existing transmission system in Lincoln County, Wyoming, south to RMPC's proposed Sage Compressor Station in Wyoming. It would construct and own a meter station within the compressor station site and then connect its pipeline to RMPC's proposed facilities. From the Sage Compressor Station, the proposed RMPP would extend 583 miles to the Nevada-California border near Searchlight, Nevada, with 0.6 mile of pipeline in Wyoming, 418.3 miles of pipeline in Utah, and 164.1 miles of pipeline in Nevada. An RMPC meter station would be located in Nevada at MP 583.

The RMPP would then connect to a new 27-mile long pipeline to be jointly owned by PG&E and PLS. The proposed pipeline system would have a maximum operating pressure of 1,235 pounds per square inch gauge.

The Sage Compressor Station, to be located on a 15-acre site, would house three 10,600-hp. gas turbine compressor units, a microwave tower, equipment building, a gas-fired standby onsite power generation unit, a 210-barrel lube oil storage tank, a 1,000-barrel raw water storage tank, oil and water treatment facilities, a 65-barrel hydrocarbon storage tank, gas cleaning and cooling facilities, and two compressor buildings, a utility building, and a control building. (Figures 2-3 and 2-4 show a profile




**PROFILE**

(NOT TO SCALE)

**FIGURE 2-3. SAGE COMPRESSOR STATION**

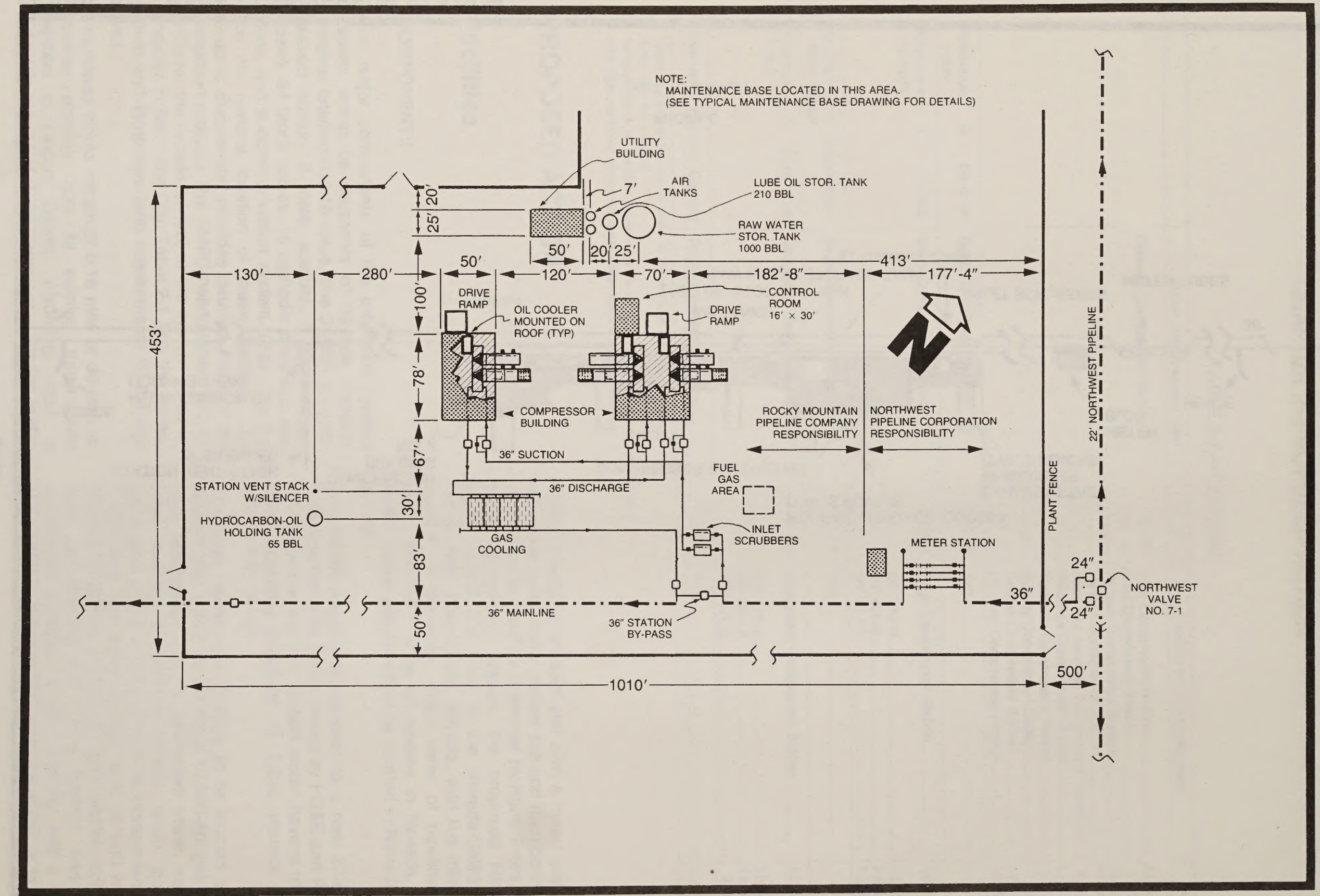



**FIGURE 2-4. PLOT PLAN OF SAGE COMPRESSOR STATION**

view and plot plan of the compressor station.) A maintenance base and Northwest's meter station would also be located on the site. Only two of the compressor units would be operated simultaneously, leaving the third as a spare. These units would consume 2,910 Mcfd of fuel gas from the pipeline. Consequently, only approximately 410,000 Mcfd of gas would be delivered to California. The compressor station would be remotely controlled from Salt Lake City by a microwave and/or radio link communications system.

Four additional maintenance bases located on 5-acre sites are proposed along the RMPP. They would be near Heber City, Utah; Nephi, Utah; Cedar City, Utah; and Las Vegas, Nevada. (Figure 2-5 illustrates a typical maintenance base.)

The compressor station, maintenance bases, metering facilities, and gas control center would use existing communication facilities where possible. The RMPP would use microwave radio links and a very high frequency (VHF) ultra-high frequency (UHF) radio system to control the pipeline transmission system. Table 2-8 lists the communication facility requirements of the project.

TABLE 2-8.

RMPP COMMUNICATION FACILITY REQUIREMENTS

| Location | Circuits | Function |
|---|---|---|
| Sage Compressor Station and Maintenance Base | 2 | Party line voice circuits with selective ringing |
| | 1 | Data circuit |
| Heber City Maintenance Base | 2 | Party line voice circuits with selective ringing |
| Nephi Maintenance Base | 2 | Party line voice circuits with selective ringing |
| | 1 | VHF control circuit drop |
| Cedar City Maintenance Base | 2 | Party line voice circuits with selective ringing |
| Las Vegas Maintenance Base | 2 | Party line voice circuits with selective ringing |
| | 1 | VHF control circuit drop |
| Nevada-California Meter Station | 1 | Party line voice circuit |
| | 1 | Data circuit |
| | 1 | VHF control circuit drop |

Fifteen cathodic protection stations, used to protect the pipeline and underground station piping from corrosion, would be installed along the proposed pipeline about every 45 miles. These each would need a source of electricity; thus, they would require unknown lengths of electric powerline to be installed. One of the stations would be located on the Sage Compressor Station site. These stations, located within a 20- by 20-foot unfenced area, would be on or adjacent to the permanent right-of-way. Additional protection from corrosion would be provided by the pipeline's internal and external coating applied at the steel mill and in the field double-jointing yards.

Block valves would be installed on the pipeline at least every 20 miles. Each of the 34 mainline block valves would be buried with aboveground controls and maintenance access and would be enclosed in a 10- by 20-foot fenced security area, as shown in figure 2-6. These valves are manually operated and could isolate segments of the pipeline system.

## LAND REQUIREMENTS

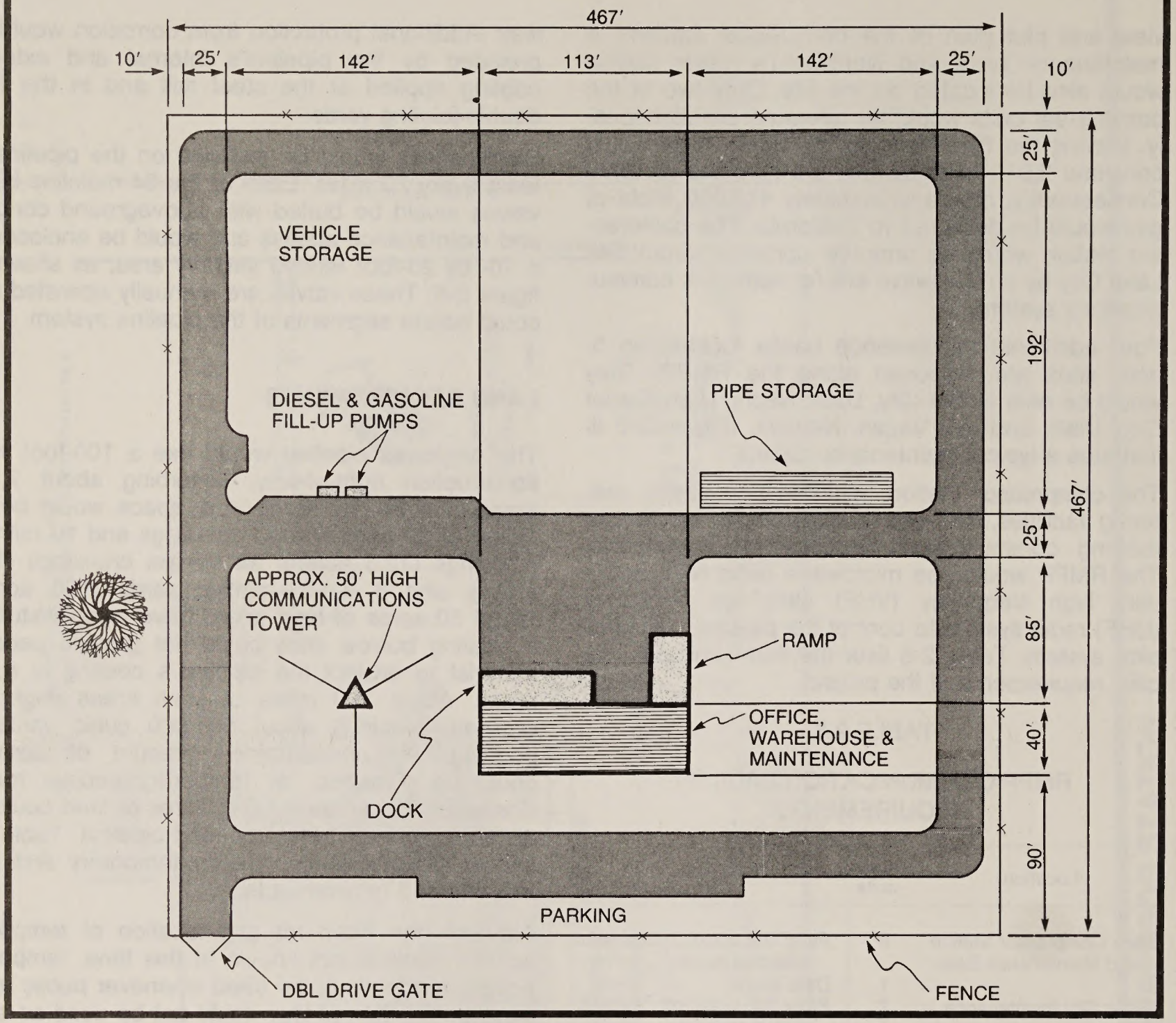
The proposed pipeline would use a 100-foot wide construction right-of-way, disturbing about 7,395 acres of land. Additional work space would be required at 33 primary road crossings and 10 railroad crossings (12.5 acres), 38 stream crossings (12.4 acres), and 8 double-jointing yards (160 acres). About 60 acres of land would have to be disturbed if existing borrow sites could not provide padding material to protect the pipeline's coating in rocky areas. About 200 miles of such areas might be crossed, requiring about 534,000 cubic yards of padding. An undetermined amount of acreage could be disturbed for temporary access roads. Consequently, at least 7,697 acres of land could be disturbed to install the proposed pipeline. Table 2-1 shows the proposed project's temporary and permanent land requirements.

Although the need for and location of temporary access roads is not known at this time, temporary access roads would be used whenever public roadways or the right-of-way could not be used as service roads during construction. No new access roads, staging areas, or storage areas are anticipated on forested lands.

The permanent aboveground facilities associated with the RMPP would require 15 acres for the Sage Compressor Station, 20 acres for the four maintenance bases, and 1 acre for the Nevada-California meter station. Permanent access roads would be needed to serve these facilities. The compressor station would require a road 0.5 mile long and 20 feet wide. The meter station road would be 3 miles long and 12 feet wide. Some of the block valves could not be reached by existing roads; a total of 7 miles of 18-foot wide road would be necessary to accomplish this. Therefore, 20.9 acres of land would be converted to permanent access roads by the project. No pipeline maintenance road is proposed within the pipeline right-of-way.

The proposed permanent pipeline right-of-way across 343 miles of WPRS, BLM, BIA, and FS lands would be up to 50 feet wide. Approximately

## PLOT PLAN




## PROFILE VIEW

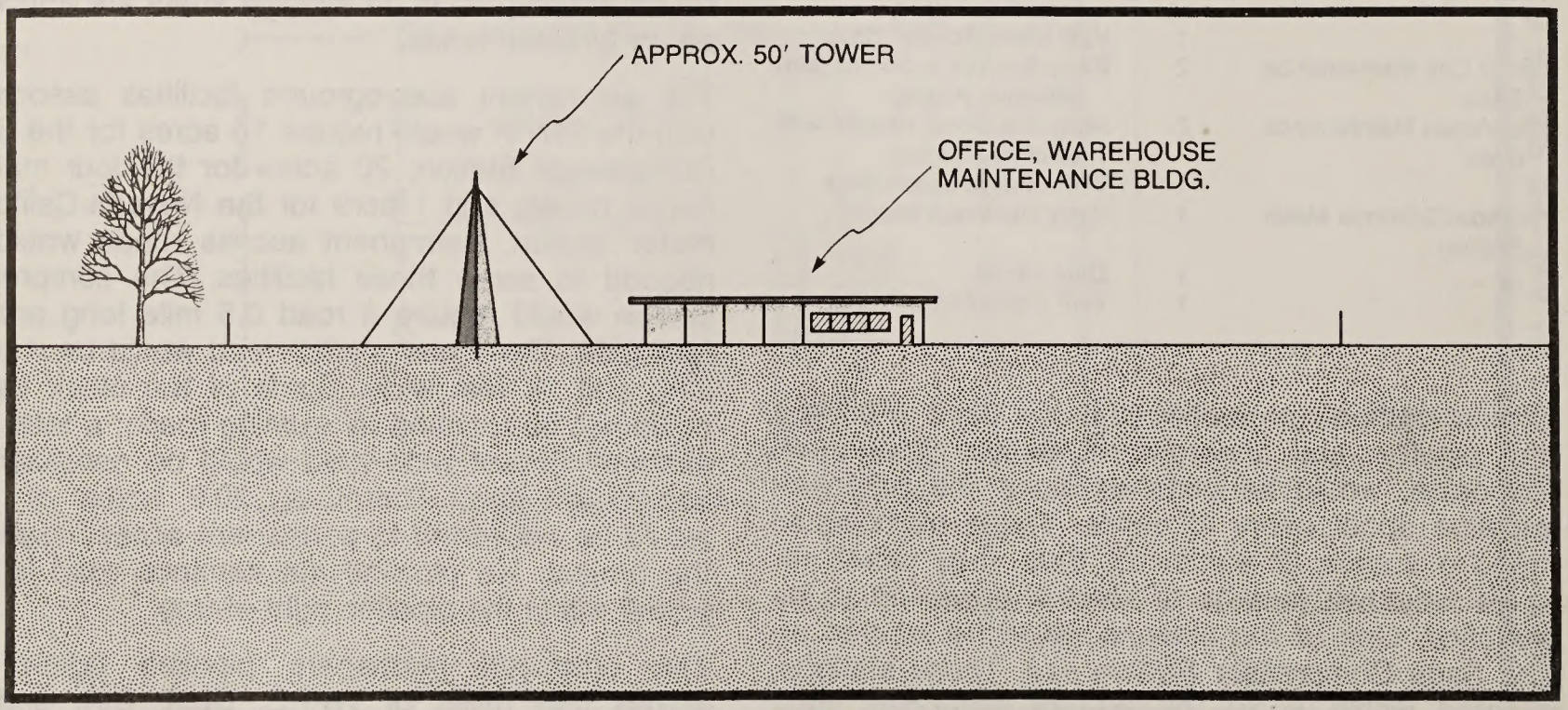



**FIGURE 2-5. TYPICAL MAINTENANCE BASE**

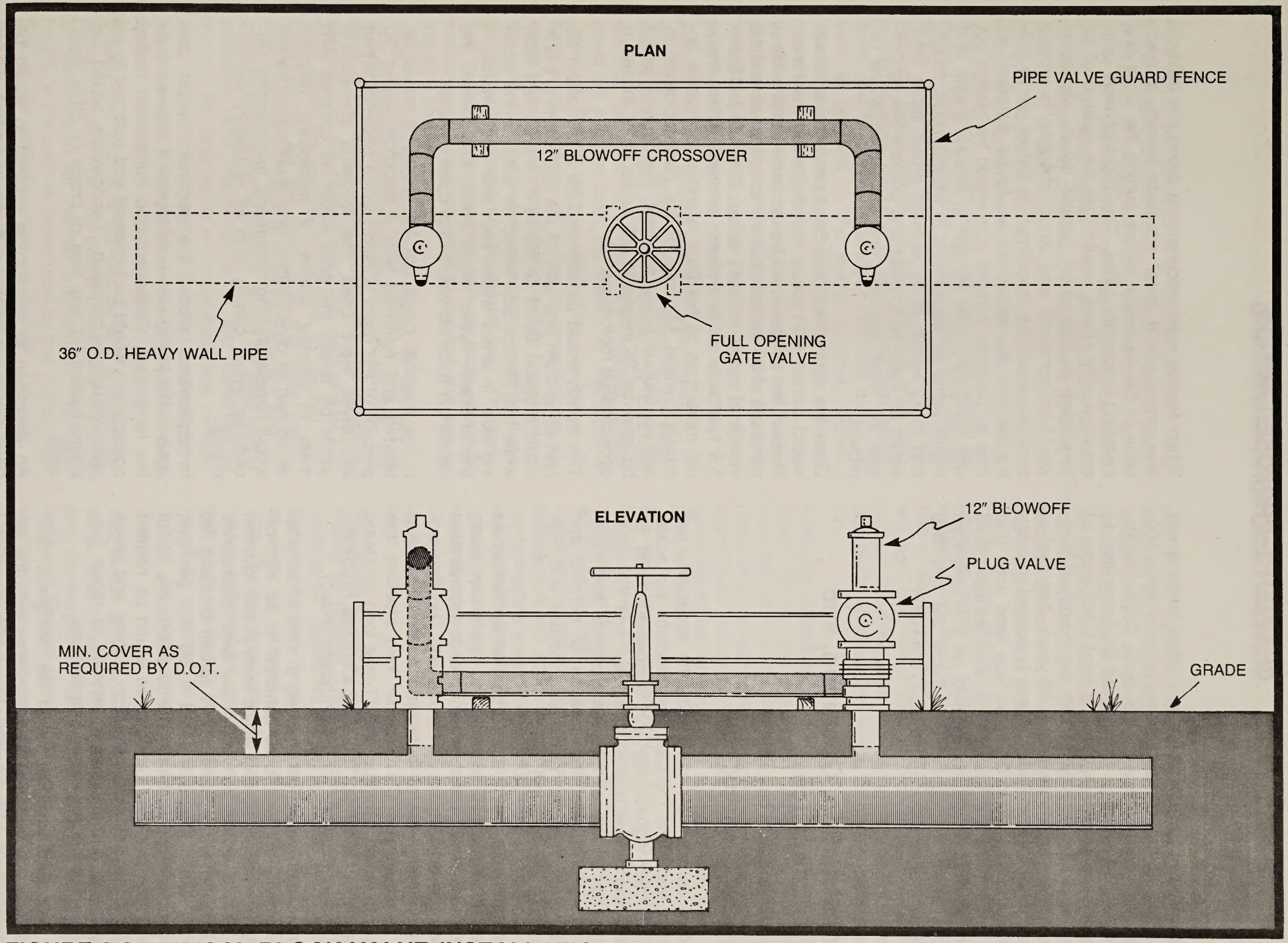



**FIGURE 2-6. TYPICAL BLOCK VALVE INSTALLATION**

268 miles of private, state, and other lands would be crossed; the applicant wants to purchase a 100-foot wide right-of-way on this land. Consequently, about 5,511 acres of land would be committed to the pipeline right-of-way, and a total 5,568 acres of land would be associated with the proposed pipeline system for a minimum of 20 years. Approval of the right-of-way on Federal lands is subject to existing authorized uses. Other surface land uses that do not conflict with the pipeline, such as agriculture and grazing, would be allowed on the unfenced areas along the right-of-way. Table 2-6 identifies the general land ownership along the RMPP.

## Construction, Operation, and Maintenance

### PIPELINE CONSTRUCTION

Before construction can begin, the applicant must survey and stake the route to determine the actual construction right-of-way. All landowners must be contacted for permission to survey, and the applicant must secure all necessary permits and easements. (For further identification of permits and easements, refer to 'Authorizing Actions and Permits' and appendix D.)

Construction of the proposed pipeline system would occur in a planned sequence of operations along the route. Seven construction spreads (coordinated work groups) would simultaneously lay the proposed pipeline. Six of these spreads would be used to construct RMPC's 583-mile long pipeline; the seventh would construct the 27-mile long intrastate pipeline in California. Table 2-2 identifies hypothetical spread locations for the proposed project.

Construction would occur along a zone of continuous activity and would be confined to the right-of-way. Normally, a spread would work at one location for 6 to 8 weeks between initial land disturbance and right-of-way restoration. A spread crossing flat terrain would progress about 5,000 feet per day, whereas on rough terrain, it would complete about 2,500 feet per day. Landowners would be notified in advance before construction begins and given assistance in making arrangements to move livestock and other necessary preparations.

All proposed facilities would be designed, constructed, and operated in accordance with the requirements of Title 49, Part 192, Code of Federal Regulations (CFR), *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards*.

When fences were encountered along the right-of-way, crews would install adequate bracing at each edge of the easement before cutting the wires and installing temporary gates. The 100-foot wide construction right-of-way would then be cleared of all vegetation except short ground cover, obstacles would be removed, and abrupt changes in ground contours would be smoothed. In flat or gently rolling country, the easement would be disturbed as little as possible. Sidehill cuts would be bladed out with bulldozers only enough to ensure a safe and stable plane for equipment. In mountainous, rough, and rocky terrain or in forested areas, more work would be required to clear and prepare the right-of-way. All trees, saplings, and stumps would be removed.

Once the right-of-way had been prepared, a trench would be cut with rotary wheel-ditching machines. Most of the trench would be excavated to provide a minimum of 30 inches of cover in soil areas and 18 inches of cover in rocky areas; it would be about 5.5 feet wide at its bottom. In areas where there are more than 10 buildings intended for human occupancy within 1/8 mile of the buried pipeline in any continuous 1-mile segment, the pipeline would be covered 36 inches in soil areas or 24 inches in consolidated rock areas.

The trench would be centered on a line about 25 feet away from one side of the right-of-way. Excavated material would be stored on the 25-foot side, while the 75-foot side would be used as the working side. In areas where rock was encountered, a tractor-drawn ripper would break and loosen the section. A backhoe would then open a trench.

If the material could not be ripped, it would be blasted and removed with a backhoe. About 30 percent of the route should require blasting. When explosives were used, the following precautions would be taken: the area would be covered with mats to prevent scatter, if necessary; flagmen would halt or divert traffic; only qualified personnel would handle blasting operations; and blasting procedures would comply with all regulatory requirements.

In agricultural areas, the applicant would use double-ditching to conserve topsoil if requested by the landowner. Cultivated land compacted during construction would be loosened and restored to its preconstruction condition. Landowners would be compensated for any loss of crops or other damages.

An exception to mechanical excavation would be hand digging to locate underground utilities. Where irrigation or other underground structures exist, the pipeline would be buried to provide 12 inches minimum clearance between the pipe and the structure.

Pipe would be delivered to a railhead location near the proposed pipeline route. It would then be either stockpiled at a double-jointing yard or delivered directly to the construction site by tractor-trailer trucks. On steep terrain, the pipe would be carried up the slope and positioned in place one joint at a time using a side boom tractor. Other material required for construction such as valves, fittings, and supporting equipment would be delivered by truck.

After the trench had been readied, pipe would be moved from the double- jointing yards and 'strung' along the right-of-way by trucks and side boom tractors. Gaps would be left between pipe segments to allow passage of farm stock and equipment and to provide drainage. The pipe would be bent to conform to the trench contour, aligned, welded together, and placed on temporary supports as a continuous pipeline along the side of the trench. Each weld would be visually and radiographically inspected in accordance with 49 CFR 192. The pipe joints would then be coated, and the pipe would be lowered directly into the trench.

Areas with high ground water or where periodic inundation occurs would require anchoring for negative buoyancy; this can be provided by concrete coating, weights, or mechanical means. Water could be pumped from the trench, or the pipeline could be floated into the ditch. The pipeline would have a minimum of 60 inches of covering material when laid under streambeds or within floodplains. If the bottom of the trench were rocky, padding material would be placed on the trench floor. The pipeline might also be wrapped with an outer shield of asphalt and fiber rockshield to prevent damage to the pipe and its coating.

After the pipeline had been placed in the trench and inspected, the excavated material would be put back in the trench. Any excess material would be spread over the right-of-way. The right-of-way surface would be graded to conform to original contours except for the berm over the filled trench, which would be allowed to settle naturally. Any excessive settlement or erosion would be filled during operation and maintenance of the transmission system. No large rocks would be backfilled immediately adjacent to the pipe. Padding material from borrow pits or foam padding would also cover and protect the pipeline in rocky areas.

Usually the backfill is compacted and a crown tapering outward from the center is left over the ditch to compensate for normal subsidence. The initial height of the berm is determined by the characteristics of the material used as backfill. Typically, a crown 12 inches high with a 20-foot wide base is necessary.

Erosion control devices or structures used would depend on the site- specific situation. These measures might include French drains, terrace ditches, sandbag ditch breakers, check dams, cross ditches, riprap, fencing, or combinations of these methods. Unconsolidated soils might be mulched to enhance the staying capacity of the soil and improve conditions for revegetation. After construction, the disturbed surface would be contoured to approximate the preconstruction grade.

Right-of-way across croplands irrigated by circular traveling sprinkler systems would be restored by waterpacking the ditch line or by special compaction or soil bagging where the ditch line intersected the sprinkler wheel line. In croplands leveled for surface flood irrigation, the backfill would be waterflooded to compact the soil to its natural consistency.

Following backfilling, all surplus excavated material, trash, debris, and equipment would be removed from the right-of-way and disposed at approved disposal sites or burned at an approved location with appropriate permits. The temporary fences and gates would be removed and replaced with permanent fencing.

Revegetation along the right-of-way and on streambanks would be accomplished using appropriate materials and methods for each particular area, in accordance with the right-of-way agreements. Landowners would be contacted to ensure their satisfaction and approval of the final restoration. In erosion-prone areas, the applicant would use mulch and supplemental fertilizers as necessary. Restoration of the right-of-way normally includes the natural reestablishment of native grasses. The U.S. Soil Conservation Service and other knowledgeable agencies would be consulted to determine specific seed mixtures.

The pipeline would be hydrostatically tested to ensure its integrity. This procedure consists of filling incremental segments of the pipeline with water and pressurizing the pipe to a predetermined level to verify its integrity in accordance with 49 CFR 192. The pipeline, tested in lengths dictated by elevation differentials, would require about 279,210 gallons of water per test segment mile. Test water would be pumped to succeeding segments to be reused as many times as practical before discharge.

Test water sources would include streams, rivers, wells, and canals. The water would be withdrawn and discharged in accordance with all applicable state and Federal regulations.

The conventional lay method would be used to construct all stream and drainage crossings if the waterways were dry at the time of construction. Low flow construction is proposed to the extent it is compatible with the construction schedule.

In flowing streams, combination equipment capable of performing as backhoe, dragline, clamshell, and crane would be used to open a trench. Water flow would be maintained during construction. The pipeline would be buried a minimum of 5 feet below streambeds. No blasting in streambeds is presently proposed.

Either the diverting method or wet method of construction would be used. Most small and wide shallow streams could be diverted to complete construction. The wet method would be used in continuously flowing one- channel streams. For wet construction, the pipe would be welded, inspected, tested, coated, and weighted on land before it was floated or dragged into the stream's trench. Concrete coating or thicker wall steel pipe would ensure negative buoyancy at river crossings and high ground water areas. Material excavated from the trench would be stored on the streambanks and used as backfill.

To minimize the time required to construct the stream crossings, the right-of-way on either side of the stream would be prepared before the crossing was constructed. Tree removal on streambanks would be limited to preserve aesthetic value, and temporary erosion control measures would be used. Streambeds would be returned to their original contours; streambanks would be cleared of all stored and introduced materials and obstructions, stabilized, and seeded to prevent erosion. In addition to these erosion control techniques, the applicant may use cofferdams or retaining walls with riprap to control bank erosion. Figure 2-7 illustrates a typical stream crossing.

In excavation areas where the water table is near the surface or where runoff from snow or rainfall accumulates, the water would normally be contained within limited lengths of trench. Earth plugs or untrenched sections could be used to isolate and limit the length of the water-affected sections.

Pipe installation does not normally require removing water from the trench, since work such as welding and weld coating is done beside the trench and does not require workers to enter the trench. At locations such as road crossings, mainline valves, and tie-in points, workers may be required to enter the excavation. In these locations, the water would be removed by a small portable pump. Depending upon its volume, the water would either be ponded for percolation into the soil or directed to the nearest drainage outfall. Normal surface water channels and ditches would be used to carry away the water without erosion or affecting ground water supply or water quality.

Where possible, the applicant intends to avoid sidehill construction in areas with side slopes greater than 20 percent. To do this, the pipeline would be routed up or down a hillside until it reached a ridge line or other acceptable location. RMPC would try to limit construction on slopes greater than 20 percent to segments less than 1,000 feet long.

Sidehill construction usually requires that the pipeline be buried in a trench cut through undisturbed soil. The track mounted construction equipment requires an essentially flat work area parallel to the trench. The split- level or two-toning sidehill construction method, which RMPC would employ to minimize cuts and high walls, uses two step-like work planes to move equipment, bring up additional pipe by tractor, and provide a trench and a pipe fabrication/holding area. Pipe is usually laid from the same side for the length of the spread. If necessary, equipment can be moved to the opposite side of the trench to lay the pipe.

Cut and fill using some of the excavated material from the sidehill cut would provide a portion of the level work plane for the construction equipment. The remainder of the excavated material would be stored on the construction right-of-way downhill from the work planes or hauled to an approved storage site. The down-slope storage area, consisting of a mounded windrow of material, would not be graded level.

Following pipe fabrication and lowering into the trench, the excavated material would be used to fill the two-toning cuts. RMPC would restore the area as nearly as possible to its previous grade. Excess material would be incorporated into the berm to compensate for natural compaction. Slope restoration, revegetation, and rehabilitation measures would include precautions to ensure adequate access to the pipeline, to maintain slope stability, and to control surface and subsurface drainage.

Highways and railroads would be bored or cut as required by permitting authorities. Boring requires cutting a hole for the pipe through a casing under the facility. In some crossings, the casing would be left and the pipeline installed within the sealed casing. (Figure 2-8 shows road crossing techniques.) Secondary farm and county roads would be cut during construction. The applicant would ensure temporary passage of traffic by a detour, temporary bridging, excavation of only half of the crossing at a time, or a combination of these methods. All crossings would meet the specifications of the owners of the facilities to be crossed.

Temporary access roads would be constructed by the pipeline contractors in each spread before or in conjunction with the pipe stringing operation; they would be restored in a manner similar to the right-of-way during cleanup operations, unless requested otherwise by the landowners. Temporary access roads would be constructed where the terrain pre-

| CONCRETE COATING | 150 LB's./C.F. | 190 LB's./C.F. |
|---|---|---|
| 0.60 DESIGN FACTOR | 5 IN. | 3½ IN. |
| 0.50 DESIGN FACTOR | 4 IN. | 2¾ IN. |

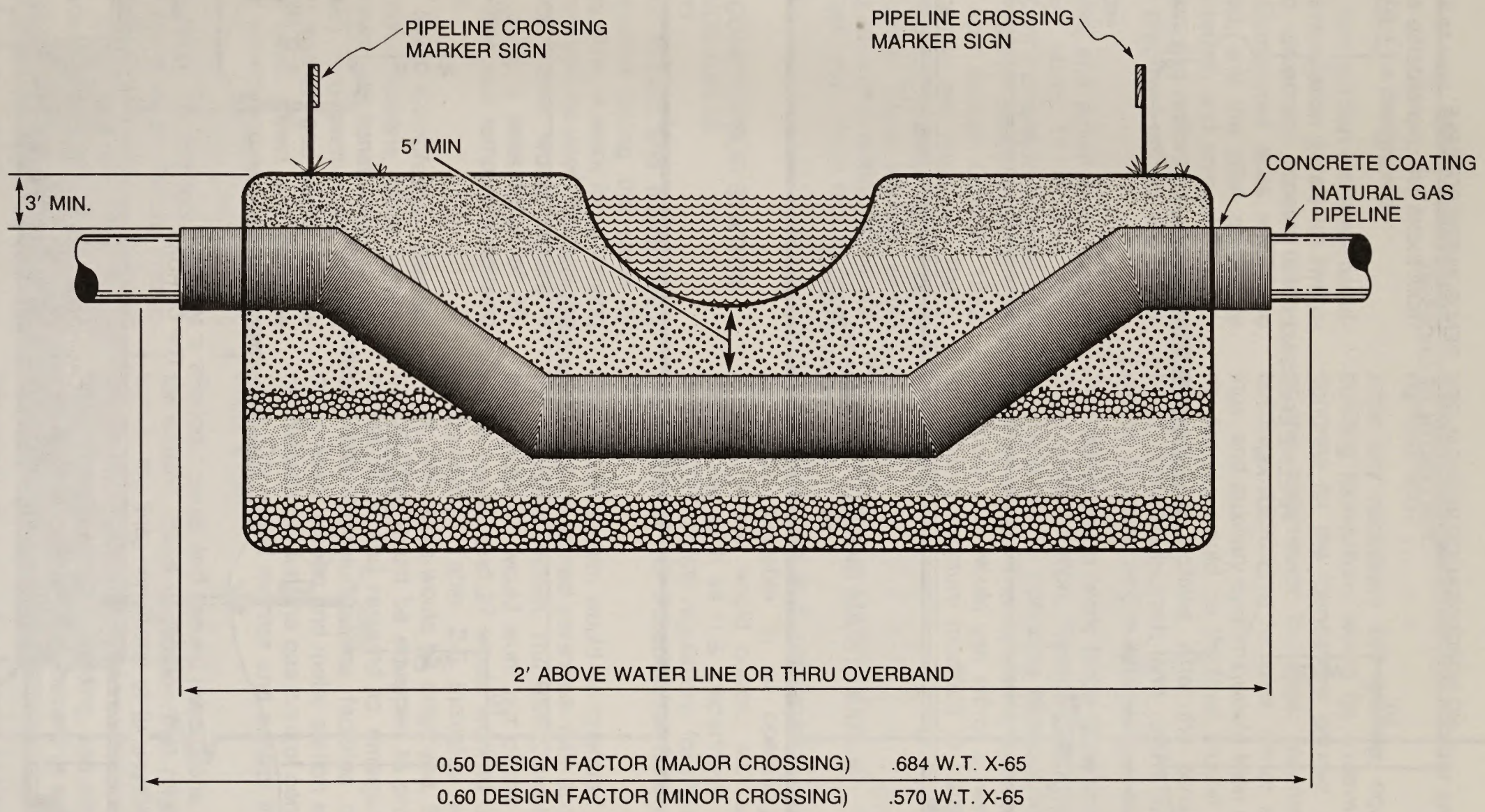
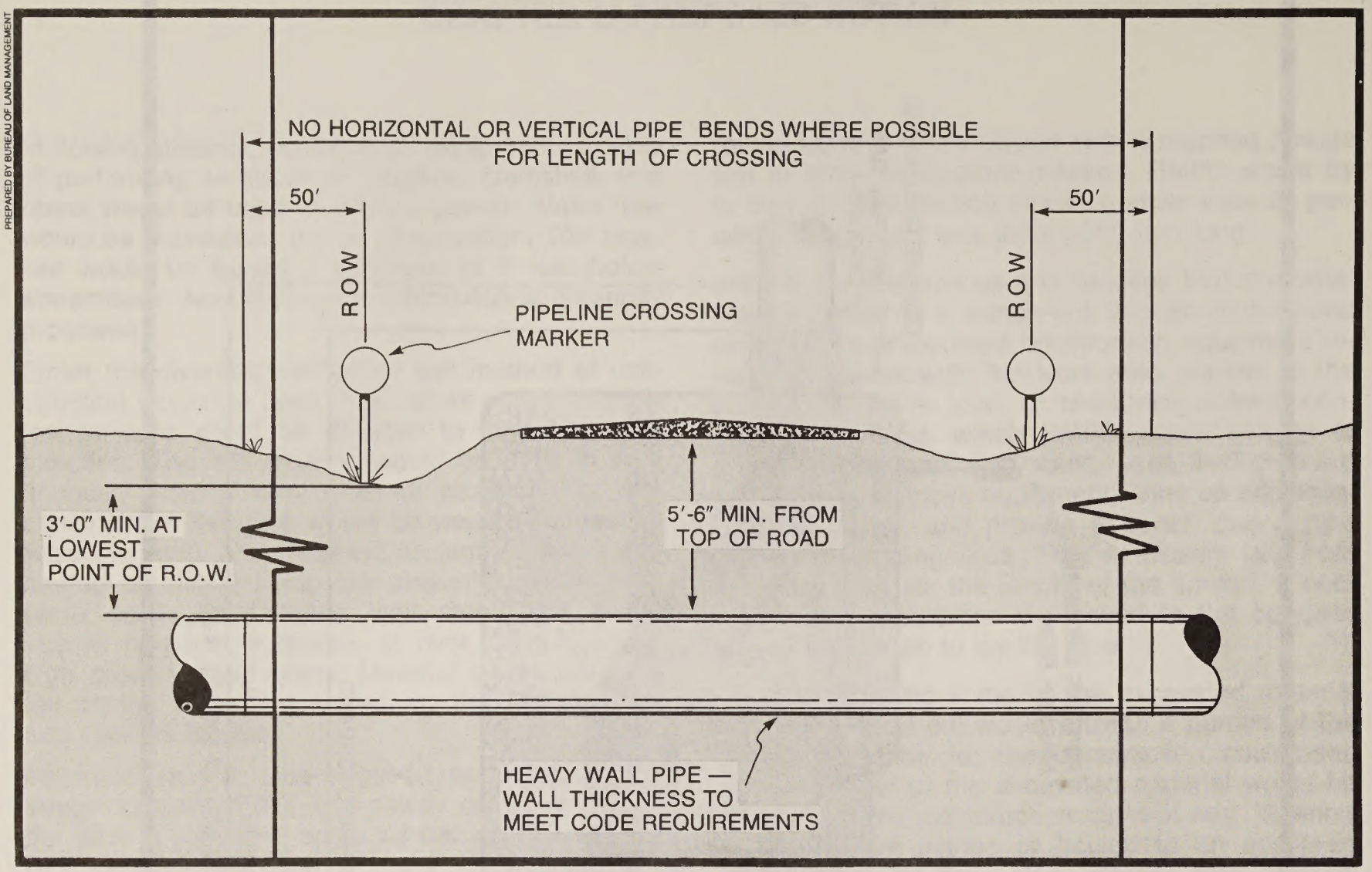



**FIGURE 2-7. TYPICAL STREAM CROSSING**

PREPARED BY BUREAU OF LAND MANAGEMENT

TYPICAL UNCASED CROSSING




TYPICAL CASED CROSSING

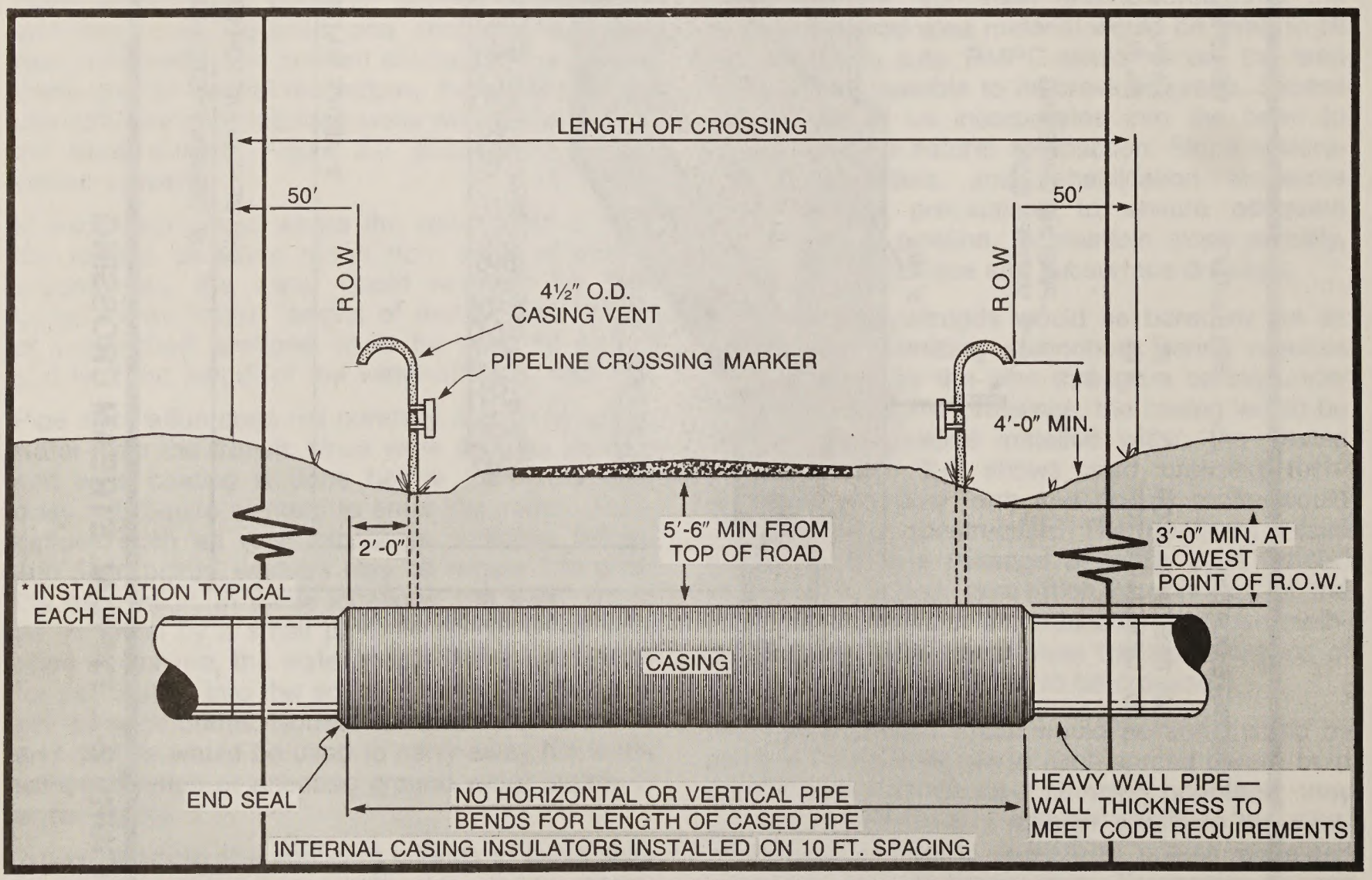



**FIGURE 2-8. TYPICAL CASED AND UNCASED ROAD CROSSING**

vented using the right-of-way during construction. Until the right-of-way is established, the exact location of these roads cannot be designated.

All sites for temporary construction facilities--including new borrow pits, evaporation ponds for hydrostatic test water, and temporary access roads--would be restored. Compacted soils would be tossed, debris removed, and the sites graded to conform with adjacent terrain and revegetated. Additional RMPC mitigation and restoration measures which are part of the proposed project are identified in appendix C.

Preconstruction activities and actual pipeline construction would require about 15 months. (See figure 2-2 for the applicant's proposed detailed construction schedule.) Pipeline construction is proposed to occur from April through October 1982. No temporary work camps are proposed. RMPC would not provide temporary housing for the pipeline construction personnel. These workers would use temporary housing accommodations in the surrounding area. The peak work force requirements are shown in table 2-3.

## CONSTRUCTION OF COMPRESSOR STATION AND MAINTENANCE BASES

The Sage Compressor Station and maintenance base would be constructed during the same 6-month period as the pipeline. A work force varying from 60 to 100 workers would be used. Each of the other four maintenance bases would require 4 months to construct, using a peak force of 20. These workers would also use temporary housing in the surrounding area.

Construction of the Sage Compressor Station, maintenance bases, meter stations, block valves, and pipeline would require the construction or improvement of temporary and permanent access roads. Each permanent access road would be constructed with adequate base, crown, and drainage to prevent erosion and provide ingress and egress from existing roads.

Electricity would be supplied by the local electric utility company to the compressor station, maintenance bases, communication facilities, cathodic protection sites, and meter stations. The Sage Compressor Station would require a 2.8-mile long extension from the nearest Utah Power and Light Company transmission line. The applicant has not identified the right-of-way and specific equipment requirements of the electric power lines--such as underground cable or poles--for any of the other sites requiring power supply. The RMPC would apply to the local power company for service, and that utility company would be responsible for obtaining the required authorizations for the number and lengths of rights-of-way.

After any necessary site grading, equipment and building foundations would be excavated and the concrete for the foundations poured. Construction of the compressor buildings, maintenance base buildings, microwave facilities, meter station buildings, and auxiliary systems would then occur. Security fencing would be installed around all of these aboveground facilities. After the construction had been completed, trash and debris would be removed and disposed in approved areas.

The construction work force requirements for the Sage meter station, Nevada-California meter station, and RMPC operating headquarters have not been provided. The operating headquarters near Salt Lake City would use either a new building or an existing structure modified to handle company operations.

## OPERATION AND MAINTENANCE

RMPC operating and maintenance manuals would be made available to all operating personnel. These manuals would comply with all applicable regulations, such as U.S. Department of Transportation (DOT) safety regulations for pipelines and all regulations of the Occupational Safety and Health Act.

The RMPP system would be operated by a permanent staff of trained personnel fully acquainted with the proposed system. The RMPC would employ 68 individuals; 41 would work out of the five maintenance bases, and 27 would work at the operating headquarters. Table 2-5 indicates where all of these individuals would be employed. Each maintenance base would be equipped to provide routine maintenance and respond to emergencies. Using the data communications facilities between the compressor station and meter station at the California-Nevada border, the gas control center near Salt Lake City would monitor and control the RMPP 24 hours a day.

Periodic aerial and ground inspections would check for erosion, dead vegetation that might indicate a leak in the line, conditions of the right-of- way, pipe exposure, unauthorized encroachment on RMPC's right-of-way such as a building, and other situations that could cause a safety hazard or require preventive maintenance.

The pipeline would be aerially inspected once a month, or more often if necessary. Ground inspection, either on foot or in a vehicle (access permitting), would occur with a maximum interval of 1 year. The pipeline block valves would be periodically inspected and serviced to ensure their operative

condition. Human activities which might encroach on the right-of- way and endanger the pipeline would be investigated immediately by maintenance personnel. Changes in population density and proximity to the pipeline would be monitored; if the class locations, defined by DOT, change, remedial action would be taken.

Periodic inspections of the pipeline's cathodic protection system would be made, and records would be maintained to monitor the status of the protection system. The pipeline must be tested at least once each calendar year, but with intervals not exceeding 15 months, to determine that the cathodic protection system is providing the proper level of corrosion control.

The right-of-way would provide access to inspect and maintain the pipeline. In accordance with DOT regulations, no trees or deep-rooted shrubs that would damage the pipeline's protective coating or prevent periodic surveillance would be allowed within 10 feet of either side of the pipeline. The right-of-way would be allowed to revegetate; however, large brush and trees over 2 inches in diameter would be periodically removed. The frequency of removal would depend on vegetation growth rate. The selective slash cuttings would be reduced by chipping or disposed in accordance with the use permits. Herbicides would be used for total vegetation control only at block valve locations and at the Sage Compressor Station. The type of herbicides used and method and rate of their application would depend upon the products available in the marketplace and restrictions placed on their use by permitting authorities. Access roads would be maintained as required to provide safe access for routing and emergency situations. All of the aboveground facility sites would be maintained by pipeline company personnel.

## Environmental and Safety Controls

In addition to corrosion inhibitor coatings inside and outside the pipe, cathodic protection would be applied to the pipe and underground station piping to minimize corrosion and prevent a possible pipe failure. This is done by impressing an electrical current in the pipeline and discharging it through a ground bed. The system would be continuously monitored to assure that corrosion was held to acceptable levels.

The pipeline would also be clearly marked at line-of-sight intervals and at crossings of public roads, railroads, and other key points. The markers would identify the RMPC and give a telephone number where a representative could be reached.

The compressor station, designed for automatic and unattended supervisory operation, could be controlled locally by switching from remote control to local control. It would be equipped with hazardous gas and ultraviolet fire detection alarm systems, a fire protection system, and an emergency shutdown system. A gas detection system would be activated at 25 percent of the lower explosive limit. Automatic emergency shutdown of the compressor units, evacuation of gas from the station piping, and isolation of the station from the mainline would occur following a fire detection alarm or the detection of a 50-percent lower explosive limit inside the station. The compressor station would also be equipped with relief valves to protect the station piping from overpressure if station or unit control systems failed. Alarms telemetered to the gas control headquarters would require the Sage maintenance personnel to investigate and take proper corrective action.

## Future Plans and Abandonment

There are currently no definite plans to increase the capacity of the proposed project; however, RMPC has indicated that the proposed design of the RMPP allows for expansion to 800,000 Mcfd, the most economic and fuel efficient throughput level. The capacity of the 36-inch diameter pipeline could be expanded to this level by constructing three additional 10,600-hp. compressor stations at MP 104.5 (Summit County, Utah), MP 229.5 (Millard County, Utah), and MP 349.5 (Iron County, Utah), installing two additional 10,600-hp. compressor units at the Sage Compressor Station, and operating all of the units simultaneously. (See the *Graphic Supplement* for maps identifying these locations.) Each of the new compressor stations would be located on a 15-acre tract of land. An expanded project would use about 12,000 Mcfd of fuel gas to deliver 788,000 Mcfd to California. No additional facilities would be required by the RMPC.

Northwest might also have to add about 80 miles of pipeline and 16,000 hp. of compression to its existing transmission system. The fuel use on Northwest's system has not been estimated. Consequently, a total of 690 miles of pipeline might be required to deliver 788,000 Mcfd.

The specific location of the gas supply for the proposed project is not known. Without this information, it is not possible to determine whether Northwest would require additional facilities to deliver

either 413,000 or 800,000 Mcfd of gas to Sage, Wyoming. Since it is impractical to speculate on actions the applicant might take in the future or to analyze unreasonably hypothetical situations, this EIS has limited its evaluation to the environmental impact of the facilities actually proposed. However, in analyzing alternatives, the facilities and fuel use requirements for expanding the RMPP to 800,000 Mcfd have been considered. This speculation on future facility requirements is necessary to assure that only technically feasible alternatives are retained as 'reasonable' alternatives.

If additional facilities are eventually proposed to expand the capacity of an existing transmission system, the applicant(s) will have to seek additional governmental authorizations and meet the requirements of the National Environmental Policy Act (NEPA) before any facilities can be constructed. An environmental evaluation of such expansion would be required before the proposal could be implemented.

The RMPP is projected to have a 20-year minimum useful life; however, the supply of gas is the major factor affecting this determination. Should additional gas supplies become available, the life of the facilities and/or the capacity could be increased.

At the end of the pipeline's useful life, RMPC must obtain authorization from the FERC to abandon its facilities. The applicant has indicated that, in this event, it would purge all natural gas from the pipeline, seal and abandon the pipeline in place, remove all aboveground facilities and foundations, dispose of all unsalvageable materials at authorized sites, and regrade and revegetate disturbed land areas, as necessary. The FERC and land managing agencies could place conditions upon the abandonment if they are needed. In addition, the abandoned right-of-way would revert to the private landowner's or agency's control.

## AUTHORIZING ACTIONS AND PERMITS

### Federal Authorizing Actions

To implement the RMPP, the following authorizing actions would be required by certain Federal agencies.

FERC
- Certificates of public convenience and necessity--RMPC (1)

BLM
- Right-of-way grant (gas pipeline)
- Temporary use permit
- Sale of mineral materials
- Right-of-way grant (electrical power transmission lines)
- Review and recommendations for antiquities permits

BIA Right-of-way grant (Moapa and Fort Mojave Indian Reservations)

FS
- Roads and trail permits
- Temporary special use permits
- Mineral materials permit
- Timber sale contracts or permits
- Antiquities permits
- Special use permits

U.S. Army Corps of Engineers
- Nationwide 404 permit for stream crossings
- Individual 404 permit for stream crossings (depending upon construction techniques)

National Park Service
- Antiquities permits for public lands administered by BLM

Federal Communication Commission
- Licenses to operate repeater stations

WPRS
- Licenses for construction and operation across lands purchased or withdrawn (3)

U.S. Environmental Protection Agency (EPA)
- National Pollutant Discharge Elimination System (NPDES) permits for Utah

### State, County, and Local Authorizing Actions

Wyoming
- Construction and operation permit for the Sage Compressor Station NPDES permits

Utah
- Right-of-way grant to cross the Rockport Lake State Recreation Area
- Encroachment permit
- Archaeological and historical survey permits
- Approval to establish labor camps (spreads)
- Construction permits to cross streams
- Air quality permits (depending upon construction techniques)
- Conditional use permit (Cache County Planning and Zoning Commission)

Nevada
- Permit to package sewage treatment or septic tanks, if needed
- Land clearing permits
- Waste water discharge permits
- Revocable or encroachment permit to cross or use state highway rights-of-way
- Archaeological and historical clearance survey permits
- Conditional use permit (Clark County Board of Commissioners)

Conditional use permit (City of Henderson City Council)

California
- Certificate of Public Convenience and Necessity (CPUC)
- Safety standard construction permits
- State highway crossing permits
- Archaeological and historical clearance
- Water discharge permits
- Burning permits
- County easements to cross county drainages
- Excavation permits to cross county roads
- Easements issued by the Water Conservation Districts
- Permits to cross ditches issued by the Irrigation Districts

## ALTERNATIVE A--NORTHERN SYSTEMS ALTERNATIVE

The Northern Systems Alternative would use the Northwest system to transport about 83,000 Mcfd of RMPP gas 583 miles from the existing Kemmerer Compressor Station in Wyoming northwest to Stanfield, Oregon (map 2-2, ABC). Northwest would exchange 240,000 Mcfd of RMPP's Rocky Mountain gas for 240,000 Mcfd of PGT's Pan Alberta gas at Stanfield. Northwest would also deliver to Stanfield 90,000 Mcfd of gas from Canada instead of hauling it south to the RMPP. At Stanfield, the combined gas volumes (413,000 Mcfd) would flow through PGT's system, moving south approximately 335 miles to the Oregon-California border (map 2-2, CD). From there, PG&E would transport the gas 296 miles south to Antioch near its load center (map 2-2, DE). PG&E would then transport the PLS and SoCal portions of the gas approximately 361 miles farther south to Hinkley (map 2-2, EFGH). Finally, SoCal would transport this gas about 28 miles south to its system at Adelanto (map 2-2, HI). The Northern Systems Alternative would transport RMPP gas a total of 1,604 miles.

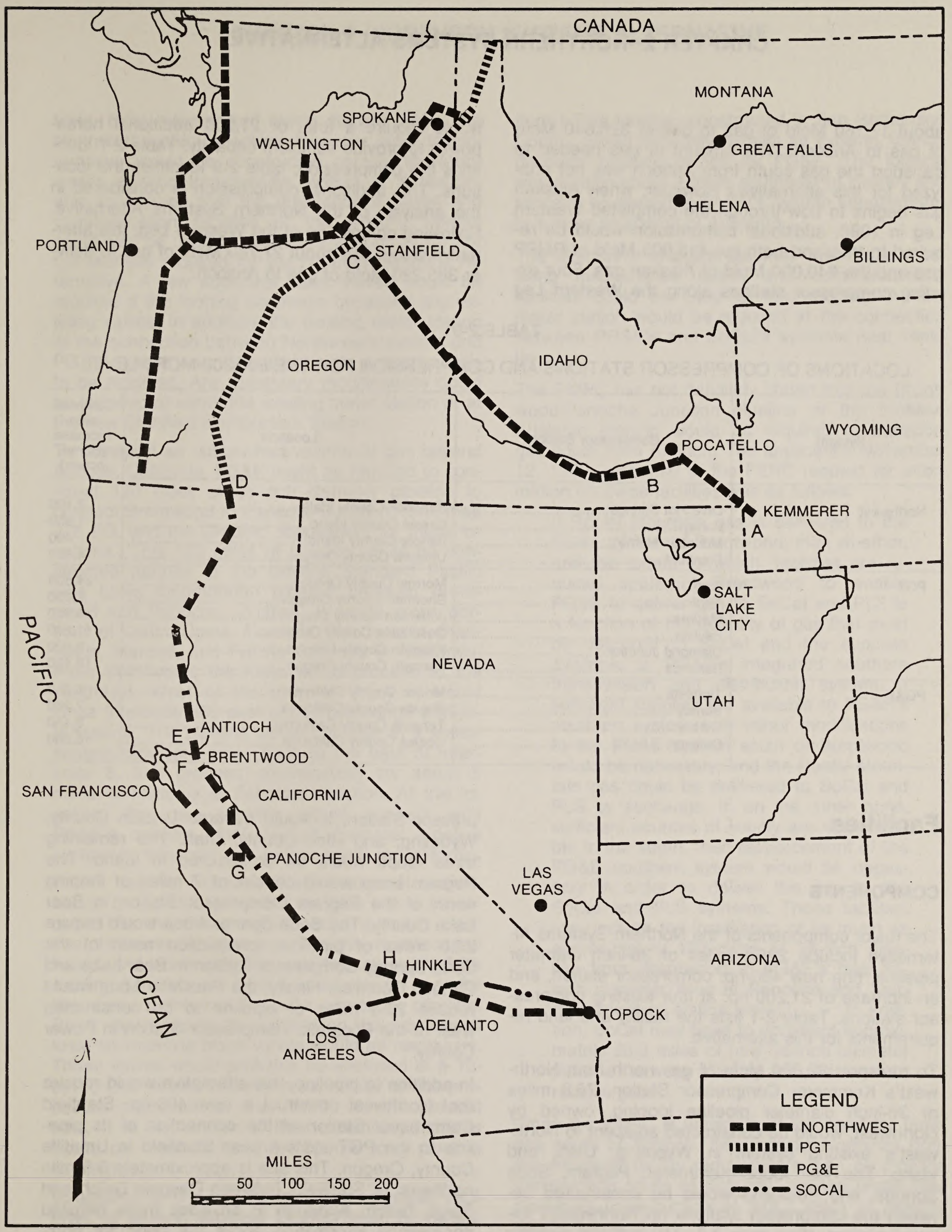
To transport the RMPP gas, the Northern Systems Alternative would require construction of 76.8 miles of looping along Northwest's existing system, a new 400-hp. Stanfield Compressor Station at Stanfield, and perhaps 120 miles of new pipeline from Brentwood to Panoche Junction and 28.3 miles of looping adjacent to PG&E's system from Hinkley to Adelanto. The alternative analysis considers both a best-case and a worst-case option, which would require both the Brentwood-Panoche Junction and the Hinkley-Adelanto segments of pipeline, and the optimum circumstance, which would require neither. The maximum 225.1 miles of 36-inch diameter pipeline construction required for this alternative would replace 610.18 miles of construction proposed for the RMPP. (See map 2- 2 for the general location of these facilities. The *Graphic Supplement* provides detailed maps of this alternative.)

The Northern Systems Alternative would also require building 380 miles of 42-inch diameter looping along the PGT and PG&E systems between Stanfield, Oregon, and Antioch, California. This construction would be a 'prebuilding' of part of the Western Leg of the ANGTS, proposed by PGT and PG&E, approved by President Carter and Congress, and conditionally certificated by the FERC to deliver Alaskan natural gas to the conterminous 48 states. (Construction of this segment of the Western Leg is anticipated to begin in 1984 or 1985 when construction for the Alaskan portion of the ANGTS begins.)

The ANGTS, a 4,800-mile long pipeline of varying diameters, is designed to carry about 2.4 billion cfd of natural gas from Prudhoe Bay, Alaska, to California and midwestern markets near Chicago. The pipeline will stretch from Prudhoe Bay on the northern coast of Alaska, along the route of the Trans-Alaskan Oil Pipeline to Delta Junction, south of Fairbanks. There the pipeline will turn southeast and continue into Canada, generally following the Alaskan-Canadian Highway. Just north of Calgary, Alberta, it will split into two sections--the Western Leg to Antioch, California, and the Eastern Leg to the Midwest. On January 19, 1981, the Secretary of the Department of Energy authorized a 42-inch diameter pipe for the Western Leg south of Stanfield.

The environmental impact of the entire 917 miles of the Western Leg has been analyzed in an FEIS issued by the DOI in March 1976. (This analysis appears in the *Alaskan Natural Gas Transportation System: FEIS--San Francisco*, which refers to the Western Leg as the 'San Francisco pipeline.') This EIS adopts by reference that document's environmental analysis of the 380 miles of looping which would be 'prebuilt' if the Northern Systems Alternative were adopted (DOI 1976). No additional discussion of the environmental impact of this part of the alternative is necessary. Furthermore, since the Western Leg will be constructed regardless of the fate of the Northern Systems Alternative, the Western Leg facilities required to transport RMPP gas are not considered in this analysis.

By constructing 76.8 miles of looping and one compressor station along Northwest's existing system, 380 miles of the Western Leg, 120 miles of new pipeline from Brentwood to Panoche Junction, and 28.3 miles of looping from Hinkley to Adelanto, the Northern Systems Alternative could transport the RMPP gas to its markets. By prebuilding a part of the Western Leg, this alternative would consume




MAP 2-2. NORTHERN SYSTEMS ALTERNATIVE

about 17,160 Mcfd of gas to deliver 395,840 Mcfd of gas to Antioch. (The amount of gas needed to transport the gas south from Antioch was not analyzed for this alternative.) However, when Alaskan gas begins to flow through the completed Western Leg in 1986, additional compression would be required to transport both the 413,000 Mcfd of RMPP gas and the 640,000 Mcfd of Alaskan gas. Four existing compressor stations along the Western Leg would require a total of 21,200 additional horsepower to provide sufficient capacity. Table 2-7 identifies the compression; table 2-9 identifies the locations. This additional compression is considered in the analysis of the Northern Systems Alternative. Following completion of the Western Leg, this alternative would use about 27,780 Mcfd of gas to deliver 385,220 Mcfd of gas to Antioch.

TABLE 2-9

LOCATIONS OF COMPRESSOR STATIONS AND COMPRESSION FOR THE 800,000-MCFD LEVEL

| System | Compressor Station | Location | Compression Increase (Horsepower) |
|---|---|---|---|
| Northwest | Lava Hot Springs | Bannock County Idaho | 2,100 |
| | Burley | Cassia County Idaho | 1,950 |
| | Mountain Home | Elmore County Idaho | 400 |
| | Stanfield | Umatilla County Oregon | 4,450 |
| PGT | Ione | Morrow County Oregon | 24,500 |
| | Kent | Sherman County Oregon | 7,250 |
| | Madras | Jefferson County Oregon | 14,650 |
| | Paulina | Deschutes County Oregon | 11,200 |
| | Diamond Junction | Klamath County Oregon | 8,000 |
| | Bonanza | Klamath County Oregon | 18,420 |
| PG&E | Tionesta | Modoc County California | 5,250 |
| | Burney | Shasta County California | 7,250 |
| | Gerber | Tehama County California | 9,450 |
| | Delevan | Colusa County California | 18,980 |

## Facilities

### COMPONENTS

The major components of the Northern Systems Alternative include 225.1 miles of 36-inch diameter pipeline, one new 400-hp. compressor station, and an increase of 21,200 hp. at four existing compressor stations. Table 2-1 lists the facility and land requirements for this alternative.

To transport 83,000 Mcfd of gas north from Northwest's Kemmerer Compressor Station, 76.8 miles of 36-inch diameter pipeline looping, owned by Northwest, would be constructed adjacent to Northwest's existing system in Wyoming, Utah, and Idaho. The four loops--Kemmerer, Pegram, Soda Springs, and Pocatello--would be constructed between the compressor stations on Northwest's existing system. (See map 2-2, AB, and the *Graphic Supplement* for these locations.)

The Kemmerer Loop would require 21.7 miles of pipeline construction north of the Kemmerer Compressor Station. It would traverse Lincoln County, Wyoming, and Rich County, Utah. The remaining three loops would be constructed in Idaho. The Pegram Loop would consist of 7 miles of looping north of the Pegram Compressor Station in Bear Lake County. The Soda Springs Loop would require 22.8 miles of pipeline construction north of the Soda Springs Compressor Station in Bear Lake and Caribou Counties. Finally, the Pocatello Loop would require 25.3 miles of pipeline to be constructed west of the Pocatello Compressor Station in Power County.

In addition to pipeline, this alternative would require that Northwest construct a new 400-hp. Stanfield Compressor Station at the connection of its pipeline to the PGT system near Stanfield in Umatilla County, Oregon. This site is approximately 0.5 mile northeast of Stanfield, between Despain Gulch and Stage Gulch. Appendix E provides more detailed engineering information about the need for compression on this alternative.

Specific information for additional facility requirements such as maintenance bases, communica-

tions, block valves, and meter stations along the Northwest system is lacking. However, since this alternative would be constructed parallel to Northwest's existing transmission system, it is reasonable to assume that the maintenance bases and communication facilities of the existing system could also be used to maintain and control/monitor the facilities required for the Northern Systems Alternative. A few additional block valves would be required if the looping segments bypassed any existing valves. In addition, the existing meter station at the connection between Northwest's system and PGT's system near Stanfield would probably have to be modified. Any necessary modifications could be installed at either the existing meter station or at the new Stanfield Compressor Station.

To transport an unspecified volume of gas beyond Antioch, California, PG&E might be required to construct 120 miles of 36-inch diameter pipeline to connect Brentwood to Panoche Junction. (See map 2-2, FG, and the *Graphic Supplement* for these locations.) This 120 miles of pipeline would be constructed parallel to the existing Standard Pacific Gas Lines Incorporated pipeline between Brentwood and Panoche Junction. It would cross portions of Contra Costa, Alameda, San Joaquin, Stanislaus, Merced, and Fresno Counties in California. From Brentwood, the route would proceed to the southeast. West of the town of Tracy, it would cross Interstate 580 east of its interchange with Interstate 5. The pipeline would continue in a southeastern direction, cross back to the east of Interstate 5, and proceed southeasterly for about 5 miles, terminating at Panoche Junction. At this location, the new pipeline would connect with PG&E's existing, dual 34-inch diameter pipeline system to transport gas farther south in California.

RMPC has not indicated if any additional maintenance or monitoring/control facilities would be required for the Brentwood-Panoche Junction pipeline. However, it appears that the maintenance bases and communication facilities along PG&E's existing transmission system could also be used for the new Brentwood-Panoche Junction pipeline. Block valves would be required on the pipeline; at least six mainline block valves would be necessary. These valves would probably be enclosed in a 10- by 20-foot fenced security area, similar to the procedure proposed for the RMPP. At the present time, it is not known if flow controlling facilities would be required for this 120-mile long pipeline segment.

In addition to the 120 miles of new pipeline, 28.3 miles of 36-inch diameter looping might be necessary between Hinkley and Adelanto to connect PG&E's dual 34-inch diameter system near Hinkley with SoCal's system near Adelanto. (See map 2-2, HI, and the *Graphic Supplement* for these locations.) This looping, constructed in San Bernardino County, would generally parallel an existing 12-inch diameter pipeline owned by PG&E. The looping would begin about 3 miles southeast of Hinkley and proceed southwest to SoCal's system approximately 4 miles southeast of Adelanto.

The alternative analysis assumes that SoCal's existing maintenance bases and communications facilities could be used for this looping. A new meter station would be required at the connection between PG&E's and SoCal's systems near Hinkley.

The RMPC has not definitely stated that the Brentwood-Panoche Junction pipeline or the Hinkley-Adelanto looping would be required to transport gas south from Antioch. The applicant's November 12, 1980, response to the FERC request for information on these facilities was as follows:

> If Rocky Mountain gas is delivered to the PG&E system at Brentwood, then whether, and the extent to which, facilities are required south of Brentwood to enable PG&E to deliver gas to SoCal and PLS is a function of the quantity of gas that must be delivered to SoCal and the supplies available to PG&E's integrated southern transmission and distribution system. If sufficient supplies are available to PG&E's southern system only minor modifications to the PG&E system south of Brentwood would be necessary, and the Rocky Mountain gas could be delivered to SoCal and PLS by exchange. If, on the other hand, sufficient sources of supply are not available in the south, then reinforcement of the PG&E southern system would be necessary in order to deliver the gas to the SoCal and PLS systems. These facilities may include the installation of as much as approximately 120 miles of 36-inch pipeline from Brentwood to PG&E's dual 34-inch diameter lines at Panoche and rearrangement of station piping . . . . In addition, SoCal may have to construct approximately 28.3 miles of new 36-inch diameter pipeline between Hinkley and Adelanto to receive gas.

Since the RMPC is uncertain of the need for facilities south of Antioch, this analysis examines both the minimum facility requirements (i.e., no pipeline construction south of Antioch) and the worst-case possibility (construction of 148.3 miles of pipeline south of Antioch).

In order to transport both the proposed volumes and the Alaskan gas volumes along the Western Leg in about 1986, 21,200 hp. of additional com-

pression would be added at four existing compressor stations on PGT's and PG&E's transmission systems. Additional compression would be required on PGT's system in the following amounts: an 8,925-hp. increase at the Ione Compressor Station in Morrow County, Oregon; a 1,450-hp. increase at the Madras Compressor Station in Jefferson County, Oregon; and a 2,375-hp. increase at the Bonanza Compressor Station in Kalamath County, Oregon. Finally, an 8,450-hp. increase would be required at PG&E's existing Delevan Compressor Station in Colusa County, California.

This EIS refers to the 'best case' of the Northern Systems Alternative as requiring only 76.8 miles of pipeline on Northwest's system and the Stanfield, Ione, Madras, Bonanza, and Delevan Compressor Stations. The 'worst case' includes all of the best-case facilities plus the 148.3 miles of pipeline within California.

### LAND REQUIREMENTS

The Northern Systems Alternative would use a 100-foot wide construction right-of-way and could disturb up to 2,728 acres of land if the maximum length of pipeline were required. This total includes 930.8, 1,454.4, and 343 acres required to construct the Northwest pipeline looping, the Brentwood-Panoche Junction pipeline, and the Hinkley-Adelanto pipeline, respectively. Land would also be required to construct one meter station (1 acre) and seven cathodic protection stations (0.07 acre). Additional work space (100 acres) might also be required at five double-jointing yards and at road, railroad, and stream crossings. In addition, an undetermined amount of acreage could be disturbed for temporary access roads used for service roads during construction. However, because this alternative would require pipeline looping along existing pipeline corridors, it is possible that some existing maintenance access roads could be used to support construction and maintenance. Table 2-1 shows the Northern Systems Alternative's temporary and permanent land requirements.

The permanent pipeline right-of-way across BLM and FS lands would be 50 feet wide; on all other land, the permanent right-of-way would be 100 feet wide. In addition, the new Stanfield Compressor Station would require a 15- acre site. Although the need for and location of meter stations are not known at this time, only one meter station, requiring 1 acre, should be necessary.

Consequently, about 2,616 acres of land would be committed to the pipeline right-of-way, and a total of 2,632 acres of land would be associated with this alternative for a minimum of 20 years. Table 2-6 identifies the general land ownership along the Northern Systems Alternative.

Land affected by the minimum facility level (best case) would include 931 acres disturbed by construction of the Northwest pipeline looping, 15 acres for the new Stanfield Compressor Station, and 60 acres for the three double- jointing yards. Therefore, a total of about 1,006 acres would be temporarily required; and a total of 833 acres of land would be associated with the minimum alternative facilities for a minimum of 20 years.

## Construction, Operation, and Maintenance

Only two construction spreads would be required to lay the pipeline for the worst-case Northern Systems Alternative. One spread would construct the 76.8 miles of looping on Northwest's system (best case); the other would construct the 146.8 miles of pipeline in California from Brentwood to Panoche Junction and from Hinkley to Adelanto. See table 2-3 for the labor requirements of the Northern Systems Alternative. If the pipeline facilities in California were not required, the labor requirements would be reduced by one construction spread.

The pipeline construction procedures for this alternative would be the same as those described for the RMPP. The construction requirements of the Stanfield Compressor Station would be similar to those of the Sage Compressor Station.

This analysis assumes that the construction schedule for the RMPP would be followed to construct the facilities for the Northern Systems Alternative.

Operation and maintenance of the Northern Systems Alternative would comply with all applicable regulations.

This alternative would employ five individuals to operate the Stanfield Compressor Station. (Table 2-5 identifies these workers.) Because the facilities for the Northern Systems Alternative would be constructed adjacent to or in proximity to the existing systems of Northwest, PGT, PG&E, and SoCal, personnel required to maintain and operate these existing transmission systems could also be used to maintain and operate the alternative. The inspection and maintenance procedures for the Northern Systems Alternative right-of-way would be similar to the procedures described for the proposed project. In addition, equivalent environmental and safety controls would be used.

## Future Plans and Abandonment

There are currently no definite plans to increase the capacity of the proposed project; however, RMPC has indicated that the proposed design of the RMPP allows for expansion to 800,000 Mcfd. The capacity for the Northern Systems Alternative could be expanded to this level by incrementally increasing the pipeline looping on Northwest's system and increasing the compression horsepower at 13 existing compressor stations and the new Stanfield Compressor Station. At the expanded 800,000-Mcfd level, 313.2 miles of additional 36-inch diameter pipeline looping on Northwest's system would be constructed between the Kemmerer Compressor Station in Lincoln County, Wyoming, and a location north of the existing Caldwell Compressor Station in Baker County, Oregon. Additional compression totalling 133,850 hp. would also be required on the Northwest, PGT, and PG&E systems: 8,900 hp. at three existing compressor stations and the new Stanfield Compressor Station on Northwest's system; 84,020 hp. at six existing compressor stations on PGT's system; and 40,930 hp. at four existing compressor stations on PG&E's system. Table 2-9 identifies these compressor stations, their locations, and the individual horsepower increase required at each location. An expanded project for this alternative would use about 63,560 Mcfd of gas to deliver 736,440 Mcfd to Antioch, California. A more detailed engineering analysis of this alternative can be found in appendix E.

The facilities of the Northern Systems Alternative would probably have a 20-year minimum useful life, contingent, of course, upon any future supply of gas.

# ALTERNATIVE B--SANPETE VALLEY ALTERNATIVE

The Sanpete Valley Alternative would be 200 miles long, resulting in a pipeline 630 miles long. This alternative route is shown on maps in the *Graphic Supplement*. It would cross 262 miles of land administered by BLM, 50 miles of FS land, 15 miles of state land, 10 miles of WPRS land (including FS land withdrawn to WPRS), 11 miles of Indian reservation (BIA) lands, and 282 miles of private land. Construction would temporarily disturb 7,636 acres; the permanent right-of-way would require 5,581 acres. This alternative would require the Sage Compressor Station, 2 meter stations, 5 maintenance bases, 34 block valves, and 15 cathodic protection stations. The land requirements for these facilities would be: Sage Compressor Station, 15 acres; meter stations, 1 acre; and maintenance bases, 20 acres.

The Sanpete Valley Alternative would depart from the proposed action at MP 176, south of Indianola, Utah. (See *Graphic Supplement* for locations of mileposts.) The alternative would follow Highway 89 through Sanpete Valley past Manti, Gunnison, and Richfield, Utah. It would continue to follow Highway 89 to a point south of Circleville, Utah, where it would proceed southwest to enter the Parowan Valley and follow Highway 91/Interstate Highway 15 for approximately 20 miles. The alternative would then extend west from Parowan and rejoin the proposed action at MP 356. The acreage and land status of the potentially affected lands are shown in tables 2-1 and 2-6.

The alternative was developed to analyze the impacts of a semirural but more populated right-of-way corridor down the Sanpete Valley which would contrast with the corresponding segment of the proposed action.

## Facilities

The aboveground facilities would be the same as those for the proposed action.

## Construction, Operation, and Maintenance

The construction techniques used for the Sanpete Valley Alternative would be the same as those for the proposed action. The number of double-jointing construction yards would be the same as for the proposed action; the facilities would be located at Evanston, Wyoming ; Provo, Nephi, Richfield, and Cedar City, Utah; Las Vegas, and Boulder City, Nevada; and Needles, California.

This alternative would transport the same amount of gas (413,000 Mcfd) as would the proposed action and would use the same amount of fuel, 2,910 Mcfd, thus delivering to California approximately 410,000 Mcfd. The operation and maintenance of this alternative would be the same as the proposed action.

## ALTERNATIVE C--CENTRAL NEVADA ALTERNATIVE

The Central Nevada Alternative would be 666 miles long, creating a total pipeline 862 miles long. It is shown on maps in the *Graphic Supplement*. This alternative would cross 416 miles of lands administered by BLM, 63 miles of FS land, 10 miles of state lands, 19 miles of WPRS land, and 354 miles of private land. Construction would temporarily disturb 10,447 acres; the permanent right-of-way would require 7,354 acres.

This alternative would leave the proposed action at MP 196 just south of Nephi, Utah. It would proceed southwest along Highway 132 to Lynndyl, Utah, where it would join U.S. Highway 6 and cross the Sevier Desert. It then would enter Nevada and continue to follow Highway 6 past Ely and Tonopah.

The alternative would enter California at MP 429 above Benton and Chalfant Valleys, proceed past Bishop, California, and into the Owens Valley. It would then follow Highway 395 past Big Pine, leave Highway 395, and follow the east side of the Owens Valley, rejoining the highway at Lone Pine, California. From there, the alternative would continue south through the Owens Valley into the Indian Wells Valley in the California Desert Conservation Area (BLM management designation). It would continue southward along the Southern Pacific Railroad and rejoin Highway 395 southwest of Ridgecrest, California, continuing south to connect with three existing east-west pipelines--the PG&E pipeline at Kramer Junction and two SoCal pipelines near Adelanto and Cajon Junction. The alternative was developed to provide an alternate route to the congested transmission corridor in the Las Vegas area. The corridor congestion and future corridor needs are an issue in that area.

### Facilities

This alternative would require the Sage Compressor Station, 2 meter stations, and an estimated 7 maintenance bases, 43 block valves, and 19 cathodic protection stations. The land requirements for these facilities would be: Sage Compressor Station, 15 acres; meter stations, 1 acre; and maintenance bases, 30 acres.

Components, facilities, and land requirements for this alternative are shown in table 2-1.

### Construction, Operation, and Maintenance

Construction techniques would be the same as those used to build the proposed action. Construction work camps would probably be required in central Nevada because the towns which could provide temporary housing may not have the capacity. Operation and maintenance procedures would also be the same as those for the proposed action. However, this alternative would use 3,520 Mcfd of fuel, thus delivering approximately 409,000 Mcfd of the initial 413,000 Mcfd to California.

## ALTERNATIVE D--SEVIER-ESCALANTE DESERT ALTERNATIVE

The Sevier-Escalante Desert Alternative would be 182 miles long, creating a pipeline of 622.8 miles long. This alternative is shown in the *Graphic Supplement*. It would cross 284 miles of land administered by BLM, 50 miles of FS land, 25 miles of state lands, 232.8 miles of private land, 1X miles of BIA land, and 20 miles of land administered by WPRS. Construction would temporarily disturb 7,539 acres; the permanent right-of-way would require 5,422 acres.

The Sevier-Escalante Desert Alternative would deviate from the proposed action at MP 196, the point where Alternative C would also leave the proposed action. It would follow Highway 6 and the Central Nevada Alternative just northeast of Delta, Utah, skirt Delta, and follow Highway 257 and the Union Pacific Railroad southwesterly through the Sevier Desert to Milford, Utah. It would continue to follow the railroad, paralleling the proposed action. Where the railroad extends west, this alternative would continue south and rejoin the proposed action at MP 364 near Newcastle, Utah. The Sevier-Escalante Desert Alternative would follow existing transportation and utility corridors for much of its length. The alternative was developed to provide an alternate corridor in a less inhabited and less developed desert area.

### Facilities

This alternative would require the Sage Compressor Station, 2 meter stations, and an estimated 5 main-

tenance bases, 34 block valves, and 15 cathodic protection stations. The land requirements for these facilities would be: Sage Compressor Station, 15 acres; meter stations, 1 acre; and maintenance bases, 20 acres.

Details on ancillary facilities would be the same as those described for the proposed action.

## Construction, Operation and Maintenance

The construction techniques and operating and maintenance procedures would be the same as the proposed action. This alternative would initially transport 413,000 Mcfd, use 2,910 Mcfd of fuel, and deliver to California approximately 410,000 Mcfd.

# ALTERNATIVE E--WEST SALT LAKE ALTERNATIVE

The West Salt Lake Alternative would be 392 miles long, resulting in a pipeline 747 miles long. It would cross 417 miles of land administered by BLM, 30 miles of FS land, 32 miles of state lands, 256 miles of private land, 11 miles of land under BIA jurisdiction and 1 mile administered WPRS. Construction would temporarily disturb 9,054 acres; the permanent right-of- way would require 6,415 acres.

The West Salt Lake Alternative would follow the existing Northwest pipeline to MP 49 near Montpelier, Idaho. It would utilize the first two loops proposed for the Northern Systems Alternative, the Kemmerer Loop and the Pegram Loop (28.7 miles). At MP 49, the West Salt Lake Alternative would leave the Northwest pipeline, make a westerly turn, and pass through the Caribou National Forest over the Bear River Range. It would pass north of Preston, Idaho, turn to the south and pass through the salt flats west of the Great Salt Lake. From there, it would cross Interstate Highway 80, pass through Skull Valley, proceed south, and rejoin the proposed route at MP 254.5 near Fillmore, Utah. The alternative was developed to provide an alternate right-of-way corridor which would avoid potential conflicts with national forest planning and with susceptible soils along the Wasatch Front.

## Facilities

This alternative would require the Montpelier Compressor Station and maintenance base, 2 meter stations, and an estimated 5 additional maintenance bases, 37 block valves, and 50 cathodic protection stations. The land requirements for these facilities would be: Montpelier Compressor Station, 15 acres; meter stations, 1 acre; and maintenance bases, 20 acres.

## Construction, Operation, and Maintenance

This alternative would require construction on the salt flats of the Great Salt Desert from MP 157 to MP 225 plus a few more scattered miles within the area. The flats appear solid, but they consist of a 1- to 2-inch thick hardpan crust with moist clay-like soil beneath. The crust cannot support the weight of a normal automobile. All construction vehicles would need wide tires or tracks to avoid sinking, plus a raised access road would also be needed for construction vehicles; this access road would be left in place to facilitate operation and maintenance (Reynolds 1981). Additional fill material would be needed to construct the raised access road; approximately 2,100 acres of borrow sites would be necessary.

Since the area has a very shallow water table, and highly corrosive salt flat soils, pipeline design would require that negative buoyancy features and corrosion inhibitors be included. Proper design would require that the pipeline have a thicker pipe wall, a thicker pipeline coating, and additional cathodic protection stations. The concrete used to provide negative buoyancy would need an added inhibitor to withstand the corrosive environment. (Bobman 1980, Schowe 1980, Reynolds 1981).

For the rest of the pipeline, construction techniques would be the same as those for the proposed action.

This alternative would move the same amount of gas (413,000 Mcfd) as would the proposed action, would use 3,200 Mcfd of fuel, and would thus deliver approximately 409,800 Mcfd to California. Operation and maintenance of the pipeline would be similar to that for the proposed action.

# ALTERNATIVE F--PROVO CANYON ALTERNATIVE

The Provo Canyon Alternative would be 115 miles long, resulting in a pipeline 619 miles long. This alternative is shown in the *Graphic Supplement*. This alternative would cross 264 miles of land administered by BLM, 18 miles of FS land, 19 miles of state lands, and 298.8 miles of private land, 11 miles of BIA land, and 9 miles of land administered by WPRS. Construction would temporarily disturb 7,502 acres; the permanent right-of- way would require 5,844 acres.

This alternative would follow the proposed route to MP 108 near Heber City, Utah. Here it would turn west, pass through Provo Canyon, and pass to the north of Orem and American Fork. It would then turn south and rejoin the proposed action at MP 214. The alternative was developed to provide an alternate route around the vicinity of Strawberry Reservoir and potential soils and planning conflicts north and south of the reservoir.

## Facilities

This alternative would require the Sage Compressor Station, 2 meter stations, and an estimated 5 maintenance bases, 34 block valves, and 15 cathodic protection stations. The land requirements for these facilities would be: Sage Compressor Station, 15 acres; meter stations, 1 acre; and maintenance bases, 20 acres.

## Construction, Operation, and Maintenance

Constructing this alternative would require installing a pipeline through Provo Canyon, a narrow, steep canyon. Existing facilities in the canyon include Highway 189, a railroad, four aqueducts, and two canals. The Provo River also flows through the canyon. Due to congestion on the canyon floor and rugged terrain, construction of the pipeline through the canyon would be difficult. Blasting a bench on the hillside could be necessary to place the pipeline. Construction could also parallel the river in places, possibly causing some river bank manipulation. It could also be necessary to construct the pipeline within the highway roadbed in certain places. (West 1981, Reynolds 1981).

Construction of this alternative would require placing the pipeline in the suburban areas around Orem, Pleasant Grove, American Fork, and Lehi, Utah. The alternative route would return to a semirural setting after passing Highway 73 by the Camp Williams Military Reservation.

This alternative would use 2,910 Mcfd of gas for fuel, thus delivering approximately 410,000 Mcfd of the initial 413,000 Mcfd to California. Operation and maintenance procedures would be the same as those for the proposed action. Depending on actual location of pipeline, access for pipeline maintenance or repair could disrupt traffic flow on Highway 189, a major road through the Wasatch Range.

# VARIATION 2--THISTLE CREEK VARIATION

The Thistle Creek Variation would utilize an existing utility corridor in Spanish Fork Canyon. It would be 27-miles long and would depart from the proposed action at MP 156, follow Highway 91 and the existing utility corridor past Thistle, Utah, to bypass a 20-mile long segment of the proposed action. No aboveground facility changes would be required. Construction procedures would be the same as those for the proposed action. The variation was developed to provide an alternate route around the dissected topography in the Dairy Fork area.

# VARIATION 3--EAST LAS VEGAS VARIATION

The 59-mile long variation would leave the proposed action at MP 487.7 nd rejoin it at MP 543.9 in Eldorado Valley, Nevada, thus bypassing 56 miles of the proposed action. It would follow the Clark County Sanitation District proposed advanced waste treatment pipeline corridor for 4 miles from variation MP 17 to MP 20 and a proposed Highway 515 right-of-way from variation MP 24 to MP 28. The waste water corridor is also an alternate route for a water pipeline which was analyzed in the DOI Allen-Warner Valley EIS. The East Las Vegas Variation would pass to the west of the Frenchman Mountains, and avoid the Rainbow Gardens and Las Vegas Wash areas.

Aboveground facilities, construction techniques, and operation and maintenance procedures would be the same as those for the proposed action. It was developed to provide an alternate route

through the Las Vegas area in case problems were to arise with the proposed route.

## VARIATION 4--FORT MOJAVE VARIATION

The 10-mile long Fort Mojave Variation would depart from the proposed route at MP 586 in California and rejoin it at MP 596. It would parallel the proposed route and deviate a maximum of 2 miles to the west. All facilities and components for the variation would be the same as those for the proposed action. Construction, operation), and maintenance procedures would be the same as those required for the proposed action. The variation was requested by the applicant in order to have flexibility in case they had trouble negotiating a right-of-way across the Fort Mojave Indian Reservation.

## VARIATION 5--MILL CREEK VARIATION

The Mill Creek Variation would depart from the proposed route at MP 156, circle to the east of the proposed action and follow a series of ridgetops to rejoin the proposed route at MP 168.7. The 21-mile long variation would replace 13 miles of the proposed route. The aboveground facilities and construction and operations procedures for the variation would be similar to those for the proposed action. The variation was developed as an additional alternate route around the steeply dissected Dairy Fork area which would be crossed by the proposed action. It is also being considered as an alternative in the FEIS for the Moon Lake Project of the Deseret Generating and Transmission Cooperative.

## VARIATION 6--DANIELS CANYON VARIATION

This variation would depart from the proposed route at MP 107.8 near Heber City, Utah, cross the proposed route three times, and rejoin it at MP 156. The 52-mile long variation would replace 48 miles of the proposed action. Construction would be along the road right-of-way for at least 7 miles in the narrow portion of Daniels Canyon. The aboveground facilities and components for the variation would be similar to those for the proposed action. The variation would follow existing roads and corridors. It was developed to provide an alternate route around the potential soils problems and planning conflicts along the proposed action.

## VARIATION 7--MOAPA VARIATION

After the EIS team identified and analyzed alternatives and variations, legislation passed (P.L. 96-491) which transferred land previously administered by BLM to the Moapa Indian Reservation in southern Nevada (see map S-10 for location of the reservation). The expansion area reserves a corridor in excess of 3,000 feet to be administered by BLM along which rights- of-way can be granted. The final EIS will analyze a variation which will follow the corridor through the Moapa Indian Reservation.

## VARIATION 8--WEST KAMAS VALLEY VARIATION

During the late stages of preparation of the draft EIS, the Kamas Valley Soil Conservation District expressed concern that the proposed route would cross through agricultural lands in Kamas Valley. The district members have requested that a new variation bypassing the valley be added to the analysis. They are planning to provide maps showing the proposed variation. Consequently the final EIS is anticipated to contain a description and analysis of a variation which would pass around the west edge of Kamas Valley.

## ENERGY CONSERVATION ALTERNATIVE

Production of natural gas in the United States peaked in 1973 and has been declining steadily ever since. The conservation alternative would have to compensate for these decreasing production volumes while replacing the volume of gas proposed for delivery by the RMPP over its projected life span. The alternative would have to meet those demands at least as well as the RMPP.

Substitution of nonenergy resources for this gas would also be vital to the success of this alternative. These substitutions would require the installation of more efficient appliances, insulation, weath-

er stripping, caulking, storm windows and doors, etc. Displacement of gas used for space heating and cooling, water heating, and generation of electricity would also be vital to the success of this alternative. To varying degrees, individuals, communities, and municipalities could use renewable energy sources such as solar power, wind, geothermal energy, and biomass generation of electricity and heat to replace natural gas.

The cost of the conservation alternative must be less than or equal to the cost of the gas displaced by each consumer. Since the gas consumers would be required to implement their own conservation plans, they must believe that the investment, amortized dover a realistic time frame, would be cost effective.

By decreasing consumer demand, conservation can be an important factor in increasing the available supply of an energy source, providing that participation in such an effort is maintained at constant or increasing levels. For this reason, consumer attitudes and behavior patterns could be a barrier to this alternative. Consumers would have to be impressed with the urgency of cooperating with the conservation effort. By rearranging daily use patterns (for example, taking cooler, shorter showers in the evening or doing wintertime laundry during the warmest portion of the day) and lowering the thermostats that control space and water heaters, individuals could lower system demands for gas.

Most of the gas proposed for delivery by the RMPP would be consumed in California; therefore, this discussion is limited to the supply and demand requirements of California and how conservation efforts could improve the state's supply of natural gas.

California has implemented a conservation program that includes both voluntary and compulsory conservation measures. Conservation of energy (including gas, electricity, and petroleum) is accomplished on four different fronts. First, the state's building codes require new homes and businesses to be insulated with R-19 value in the roofs and R-11 values in the walls and to be equipped with thermopane windows. Additionally, 5 percent of all new homes are required to incorporate passive solar design. Second, the state has set new appliance standards that require automatic pilot lights, flue dampers, and other technologically advanced energy conservation devices. Third, an incentive-based home insulation program has been established to encourage homeowners to retrofit old homes with insulation and anti-infiltration devices. Finally, California is encouraging the use of renewable energy sources as much as practical; the effect of this policy is to decentralize the sources of electricity and gas.

Decentralization involves shifting the responsibility of energy production from the producing utility to individual industries, businesses, and homeowners. Individuals can produce their own energy by using renewable resources such as solar energy, wind, wood, and geothermal energy (residential applications primarily include the use of cold well water for air conditioning, subterranean or partially subterranean housing, etc.). Over the next 20 years, these renewable sources of energy should be responsible for an ever-increasing portion of the energy consumed in California. As these decentralized sources of energy gain in popularity, the centralized utilities will notice a decrease in the consumers' per capita demand for energy.

In addition to the direct effect of replacing oil and gas for residential heating, renewable energy sources will also replace some of the oil and gas necessary for utility companies to produce electricity. Presently, oil and gas are the two primary sources of energy for electrical power generation in California. Renewable sources with the most potential to replace some of this oil and gas are geothermal sources and wind. The California Energy Commission (CEC) has not adopted President Carter's goal of reducing the consumption of oil and gas used in electrical generating plants 50 percent below 1977 consumption, but some mandatory reductions appear likely (CEC 1979).

Total consumer demand for natural gas in California already exceeds supplies available during the heating season. Natural gas companies are presently curtailing deliveries to their low priority customers during peak demand periods; this is expected to continue (CEC 1979, FERC 1979). Availability of natural gas has increased in California in the past few years. Part of increase is directly attributable to conservation efforts made by utility companies and residential end-users and to fuel switching. However, these increases are only about a third of what the market presently requires to keep pace with population increases. The CPUC says that growth of the consumer market is about 1.5 percent, while present conservation measures are matching only 0.5 percent of that rate (King 1980).

As an alternative to the RMPP, conservation has several inherent problems. First, many individuals have already incorporated energy-saving devices and insulation into their homes and businesses. These individuals can do little else to reduce their energy needs because the addition of more insulation would only produce a diminishing return on their capital investment. Second, nearly a third of California's population lives in rental housing. Neither the renter nor the landlord is likely to incorporate energy-saving devices or insulation into these residences. Finally, a large portion of the remaining

population either does not care about conservation, is too poor to afford insulating materials, or cannot be convinced that conservation is necessary.

Conservation cannot adequately replace the volumes of gas proposed for delivery by the RMPP. The current available gas supply is not adequate to satisfy demand without curtailing low priority customers. Additionally, there are demands for new service which further tax the available supply. This is true in spite of the fact that many Californians have already begun participating in state-sponsored conservation programs. Therefore, it is reasonable to assume that under the existing market conditions, further conservation efforts would continue to fall short of demand.

California presently receives gas from the Southwest and Canada to augment the gas produced within the state. In 1990, the CPUC anticipates that nearly all of the state's gas requirements will have to be supplied from Canadian sources, LNG imports, Alaskan North Slope gas, and the Overthrust region. The most vulnerable potential gas supply is the LNG import facility at Point Conception, California. There is strong opposition to the facility, and it may not be completed. Litigation will undoubtedly delay this project for quite some time. Most of the existing Canadian gas supply is governed by contract licenses that begin to expire in 1987. It is not possible to estimate how much Canadian gas will be available in the future. In addition, the Alaskan North Slope gas transported by the ANGTS may not be available before 1990.

If the LNG import facility is not built and Canadian gas imports are reduced or eliminated, California could experience serious gas supply shortfalls during the 1990's. If the RMPP were denied in favor of a conservation alternative and such a supply shortage developed, California would have only its traditional sources and the Alaskan gas to supplement its requirements, providing that the ANGTS is built. On the other hand, deregulation of natural gas may raise the price of gas, significantly reducing consumption. Because of these supply and demand uncertainities, it is impossible to determine whether the conservation alternative could eliminate the need for the proposed project. Additionally, neither the FERC, the DOI, nor the FS have the authority to require the State of California to implement comprehensive conservation and renewable energy programs intended to replace volumes of natural gas that could be delivered by the proposed project.

## LOW FLOW ALTERNATIVE

The low flow alternative would use the spare capacity available in the existing systems of Northwest, El Paso, PGT, and PG&E, to transport incremental volumes up to 100,000 Mcfd from the Rocky Mountain Overthrust Belt to markets in California. It would transport gas to California through existing systems without any new facility construction. This alternative would only delay construction of the proposed project until the gas supply under firm contract for the RMPP exceeded the capacity of existing systems. For example, PGT has indicated in its environmental report submitted to the FERC on July 31, 1979, that Northwest has agreed to an arrangement to transport up to 100,000 Mcfd on a best-effort basis, PGT included the following description of the feasibility of such transportation arrangements:

> ...Applicant, NGC and PTS have also recently concluded a letter of agreement with Northwest under which the latter will provide transportation and/or exchange service relating to natural gas produced and purchased from specified areas of the Rockies in the vicinity of the Northwest system. In order to rely on this agreement to transport additional volumes of Rocky Mountan gas to California, agreements will also be necessary relating to the use of the PGT existing system or the El Paso system, or both. These are being negotiated, and Applicant understands that NGC intends to rely upon such arrangements involving the use of existing facilities to make Rocky Mountain gas available to PGandE during the build-up of NGC's Rocky Mountain supplies, until volumes of gas available are sufficient to require the transportation services of the Rocky Mountain Pipeline Project.... The recent Northwest transportation agreement is limited to 100 Mcfd....

The applicant has indicated that existing pipeline transmission systems are capable of handling a 100,000 Mcfd flow without major facility modifications. Because there are no gas transportation under contracts and existing systems can handle 100,000 Mcfd, the proposed project should not be constructed until the RMPC has firm transportation contracts exceeding at least 100,000 Mcfd of gas for the life of the project.

## NO ACTION OR POSTPONED ACTION

The actions that are available are to grant the various permits that are sought, to deny them, or to postpone action pending further study. If action were postponed, one of the other two actions would ultimately follow. The FERC is solely responsible for determining whether the RMPP is in the public interest; it will determine the need for the project.

Denial of the RMPP could result in no construction of the proposed system, construction of an equivalent alternative system, or use of alternative energy sources.

The alternative of 'no action'--i.e., rejecting the RMPC proposal--would mean that the proposed volumes of gas would not be transported to California by the RMPC. However, if the proposed RMPP were denied, it is likely that a similar system would ultimately be proposed or that existing systems would be expanded to carry the same gas to market areas which could include the applicant's. If the volume of gas proposed for transportation materialized, the gradual expansion of existing systems might not be environmentally desirable for two reasons. First, ultimate construction requirements could be greater and could impact more environmentally sensitive areas than those to be crossed by this proposal. Second, the environmental and technical review by public and governmental participants would probably not be as great for individual projects, which together would produce as much or more impact.

Denial of the RMPP could also lead to greater use of alternative energy sources.

## ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Six total project/system alternatives were considered but eliminated from detailed consideration: the Northwest/Southwest, Northern Route, Northern Route and Southwest Gas, Northwest/El Paso, Northwest/PGT/PG&E, and North- South Alternatives. These alternatives would use existing pipeline systems and routes and might also establish new pipeline alignments. A description and analysis of these alternatives can be found in appendix F.

Several route alternatives were also considered but eliminated. These alternatives are discussed in appendix F.

## RMPP INTERRELATIONSHIP WITH OTHER PLANNED PROJECTS

Projects that are in the planning stages and within or adjacent to the RMPP or alternatives were examined to determine possible conflicts and coordination requirements. Planned projects with construction schedules possibly overlapping that of the RMPP are listed in table 2-10.

Since the RMPP could be drawing from the same work force available to these projects, the socioeconomic impact to local services and social infrastructures could increase. RMPP could directly affect the same surface resources as those directly affected by another project. The facilities associated with these projects could also conflict with RMPP facility locations. These conflicts are also identified in table 2-10.

TABLE 2-10.

ROCKY MOUNTAIN PIPELINE PROJECT INTERRELATIONSHIP WITH OTHER PLANNED PROJECTS

| Alternatives | Project | Project Description | Location | Construction | Employment | Conflicts and Coordination Requirements with RMPP |
|---|---|---|---|---|---|---|
| RMPP | CENTRAL UTAH PROJECT (CUP) | Transportation of Uinta Basin Water to the Wasatch Front--reservoir, portals, aqueducts, tunnels, and operation and maintenance building. | MP 131.5 and 140 | Mid-1981 to Mid-1983 | 20 to 40 | Overlapping construction schedule requiring coordination of facility locations and rehabilitation. |
| RMPP | MOON LAKE PROJECT | Two-345-kV A.C. powerlines originating from a powerplant in Vernal, Utah/Rangely, Colorado area. | MP146 to MP 190 | May 1981 to January 1984 | 20 to 45 | Corridor sharing coordination for 44 miles involving vegetation clearing, access roads, rehabilitation and construction scheduling. |
| RMPP | HUNTER 3 and 4 PROJECT | One-345-kV A.C. powerline | MP 156 | mid-1981 to Mid-1982 | 20 to 45 | Overlapping construction schedules, requiring coordination of facility locations, rehabilitation. |

TABLE 2-10.—Continued

| Alternatives | Project | Project Description | Location | Construction | Employment | Conflicts and Coordination Requirements with RMPP |
|---|---|---|---|---|---|---|
| RMPP | NEWCASTLE GEOTHERMAL RESOURCE PROJECT | Development of direct use of geothermal reosurces. | MP 366 to MP369 | Well drilling ongoing | 16 | There could be conflicts with locations of wells, pipelines and transmission lines and possibly with construction schedules. |
| RMPP | NEVADA POWER COMPANY EXPANSION AT REID GARDNER GENERATING STATION | Expansion of powerplant and electrical transmission system. | 5 miles northwest of MP 460 | 1931 to? | Data unavailable | Could overlap construction schedule affecting local services. |
| RMPP, Sevier-Escalante Desert Alternative | ROOSEVELT HOT SPRINGS GEOTHERMAL PROJECT--KNOWN GEOTHERMAL RESOURCE AREA (KGRA) | 11 geothermal wells drilled; 77 geothermal wells proposed. 20 MW powerplant proposed. | MP 292 to MP 304 on RMPP | February 1981 through 1983 | 16 to 200<br>200 | Corridor would cross through this geothermal project. There could be conflicts with locations of wells, pipelines and transmission lines and possibly with construction schedules, socioeconomic pressure on the town of Milford, Utah. |
| RMPP, Central Nevada and Sevier-Escalante Desert Alternatives | MX SYSTEM U.S. AIR FORCE | Proposed MX Missile System | Adjacent to U.S. Highways 6/50 and 6, on Central Nevada Alternative adjacent to corridor from MP 140 to MP 180 on Sevier-Escalante Desert Alternative.<br>Adjacent to RMPP corridor from MP 320 to MP 360. | 1982 to 1986 | 21,000 to 22,000 workers at peak. | Coordination of pipeline location with MX facilities. Possible conflict with construction schedule. |
| RMPP, Central Nevada, Sevier-Escalante Desert and West Salt Lake Alternative | INTERMOUNTAIN POWER PROJECT (IPP) | 3,000-MW powerplant. | Plant site approximately 10 miles north of Delta, Utah. | July 1981 to 1989 | 1981--160 employed at powerplant site; 1985--peak work force | Overlap of construction schedules, causing pressure to local services. |
| Central Nevada and Sevier-Escalante Desert Alternatives | MARTIN-MARIETTA CEMENT PLANT | Production of 650,000 tons of cement per year. | MP 23 to MP 26.5 on both alternatives. | Mid-1981 | 300 | Possible conflict between cement plant and pipeline locations. |
| Provo Canyon Alternative | IMPROVEMENT OF U.S. HIGHWAY 189, PROVO CANYON | Alignment changes and widening of U.S. 189. | MP 21.5 to MP 30 | Mid-1982 to Mid- 1983 | 20 to 30 | Coordination of pipeline location with road construction work required. |
| RMPP, Sevier-Escalante Desert Alternative | THERMAL HOT SPRINGS (KGRA) | Possible development as described for the Roosevelt Hot Springs Geothermal Project. | MP 142 to MP148 on Sevier-Escalante Desert Alternative.<br>MP 320 to MP 326 on RMPP | Unknown | Unknown | There could be conflicts with locations of walls, pipelines, and transmission lines and possibly with construction schedules. Possible socioeconomic pressure on the town of Milford, Utah. |

# COMPARATIVE ANALYSIS OF THE PROPOSED ACTION, ALTERNATIVES, AND VARIATIONS

Table 2-11 compares all significant and some less significant impacts which would be created by the RMPP, its alternatives, or the variations. The comparative analysis is a synthesis of information from chapters 2, 3, and 4.

This table compares the alternatives to the proposed action differently than it compares the variations. Each alternative is considered as a method of transporting natural gas from the Overthrust Belt in Wyoming to southern California which would avoid possible conflicts along the route of the proposed action. Consequently, impacts along each alternative route are considered. The impacts along the proposed action north and/or south of the alternative are included to understand the total impact of each possible pipeline system. The shorter variations, however, are variants of the proposed action which would avoid potential specific localized conflicts; therefore, they are considered as segments which could substitute for segments of the proposed action.

Information is presented in the table for the proposed action, alternatives, and variations. Presentation varies for each of these. Total impacts to each resource category are shown for the proposed action. Asterisks flank these figures, indicating that they are totals.

For each alternative, three types of information are shown: on top, the impacts from the alternative; just beneath, the impacts for that portion of the RMPP which would be replaced by the alternative (this type of information is always shown in parentheses); and finally, beneath the rest, the impacts for the *TOTAL* alternative pipeline system (again, flanked by asterisks which indicate totals).

Impact of the total alternative pipeline system is not presented in table 2-11 for socioeconomics, geology and topography, air quality, noise quality, a pipeline safety. These are discussed in the text.

Two types of information are shown for the variations: the impacts from the variation and (in parentheses) the impacts from that portion of the proposed action which it would replace.

The proposed action and all alternatives and variations were analyzed to determined the amount of fuel use per day versus the amount of natural gas transported. Table 2-12 identifies the results of this analysis. The discussion in 'Total System Comparison' under the Northern Systems Alternative in this section provides more detail on this alternative's fuel use.

Another comparison among the proposed action, alternatives, and variations has been made for the length and percentage of each pipeline route which would parallel or utilize existing corridors. This data is located in appendix G.

TABLE 2-11

**COMPARATIVE ANALYSIS OF IMPACTS FROM PROPOSED ACTION, ALTERNATIVES AND VARIATIONS**

| Resources | Proposed Action | Alternative A, Northern Systems | | Alternative B, Sanpete Valley | Alternative C, Central Nevada | Alternative D, Sevier-Escalante Desert | Alternative E, West Salt Lake | Alternative F, Provo Canyon | Variation 2, Thistle Creek | Variation 3, East Las Vegas | Variation 4, Fort Mojave | Variation 5, Mill Creek | Variation 6, Daniels Canyon |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Best Case[1] | Worst Case[1] | | | | | | | | | | |
| **VEGETATION** | | | | | | | | | | | | | |
| Total Acres of Native Vegetation Temporarily Disturbed[2] | *6,330 acres* | 931 acres (6,330 acres) *931 acres* | 1,662 acres (6,330 acres) *1,1662 acres* | 1,299 acres (1,577 acres) *6,215 acres* | 7,078 acres (4,413 acres) *9,149 acres* | 1,648 acres (1,431 acres) *6,495 acres* | 4,098 acres (2,412 acres) *8,071 acres* | 1,030 acres (1,054 acres) *6,300 acres* | 266 acres (242 acres) | 715 acres (679 acres) | 120 acres (120 acres) | 253 acres (158 acres) | 557 acres (582 acres) |
| Acres of Timber, Pinyon-Juniper and Mountain Brush kept Cleared for Life of Project on 25-foot Width over Pipeline | *372 acres* | 30 acres (229 acres) *30 acres* | 30 acres (229 acres) *30 acres* | 295 acres (180 acres) *869 acres* | 495 acres (525 acres) *715 acres* | 75 acres (180 acres) *606 acres* | 167 acres (295 acres) *372 acres* | 330 acres (287 acres) *411 acres* | 27 acres (12 acres) | None (None) | None (None) | 57 acres (30 acres) | 112 acres (120 acres) |
| Acres of Riparian Habitat Crossed[3] | *14 acres* | 2 acres (14 acres) *2 acres* | 8 acres (14 acres) *8 acres* | 8 acres (2 acres) *19 acres* | 12 acres (5 acres) *20 acres* | 3 acres (2 acres ) *14 acres* | 5 acres (10 acres) *10 acres* | 2 acres (4 acres) *12 acres* | 2 acres (None) | 0.5 acre (None) | 0.2 acre (None) | 0.2 acre (None) | 2 acres (None) |
| Federal Threatened or Endangered Plant Species Potentially Affected | *8 species* | None (11 species) *None* | 2 species (11 species) *2 species* | 4 species (2 species) *11 species* | 10 species (10 species) *12 species* | None (1 species) *10 species* | 2 species (3 species) *8 species* | 1 species (3 species) *9 species* | None (1 species) | None (2 species) | None (None) | 1 species (None) | 1 species (1 species) |
| State Classified Plant Species Potentially Affected- **California** | *None* | None (None) *None* | None (None) *2 species* | None (None) *None* | None (None) *4 species* | None (None) *None* | None (None) *None* | None (None) *None* | None (None) | None (None) | None (None) | None (None) | None (None) |
| **WILDLIFE[4]** | | | | | | | | | | | | | |
| Big Game Winter Range | *1,903 acres* | 327 acres (1,903 acres) *327 acres* | 327 acres (1,903 acres) *327 acres* | 957 acres (400 acres) *2,460 acres* | 654 acres (1,128 acres) *1,588 acres* | 327 acres (315 acres) *1,915 acres* | 848 (1,297 acres) *1,454 acres* | 679 acres (327 acres) *2,254 acres* | 242 acres (194 acres) | None (None) | None (None) | 254 acres (133 acres) | 206 acres (48 acres) |
| Desert Bighorn Sheep Areas | *303 acres* | None (303 acres) *None* | None (303 acres) *None* | None (None) *303 acres* | 85 acres 2 'point' sites (303 acres) (5 'point' sites) *85 acres* *2 'point' sites* | None (None) *303 acres* *2 'point' sites* | None (None) *303 acres* *2 'point' sites* | None (None) *303 acres* | None (None) | 24 acres 4 'point' sites (73 acres) (3 'point' sites) | None (None) | None (None) | None (None) |
| Waterfowl Nesting Areas | *412 acres* | 497 acres (412 acres) *497 acres* | 497 acres (194 acres) *691 acres* | 497 acres (None) *909 acres* | 303 (None) *873 acres* | 24 acres (None) *618 acres* | None (412 acres) *254 acres* | None (None) *412 acres* | None (None) | None (None) | None (None) | None Known (None Known) | 109 acres (121 acres) |
| Sage Grouse Habitat | *400 acres* | 206 acres (400 acres) *206 acres* | 206 acres (400 acres) *206 acres* | 315 acres (None) *715 acres* | 533 acres (36 acres) *800 acres* | 97 acres (None) *497 acres* | 388 acres (364 acres) *558 acres* | None (97 acres) *303 acres* | None (97 acres) | None (None) | None (None) | None (400 acres) | 97 acres (61 acres) |
| Raptor Habitat | *618 acres* | 654 acres (618 acres) *654 acres* | 2,109 acres (618 acres) *2,109 acres* | 667 acres (48 acres) *1,236 acres* | 715 acres (170 acres) *1,164 acres* | 48 acres (109 acres) *594 acres* | 170 acres (448 acres) *351 acres* | 545 acres (400 acres) *764 acres* | 230 acres (73 acres) | None (None) | None (None) | None Known (376 acres) | None Known (48 acres) |
| Golden Eagle Nest Areas | *242 acres* | None Known (242 acres) *None Known* | None Known (242 acres) *None Known* | 667 acres (158 acres) *812 acres* | None Known (218 acres) *None known* | 61 acres (24 acres) *279 acres* | None Known (218 acres) *242 acres* | 545 acres (12 acres) *776 acres* | 230 acres (224 acres) | None (None) | None (None) | None Known (12 acres) | None Known (12 acres) |
| Desert Tortoise Habitat Not Federally Designated as Critical Habitat | *982 acres* | None (982 acres) *None* | None (982 acres) *None* | None (None) *982 acres* | 558 acres (982 acres) *558 acres* | None (None) *982 acres* | None (None) *982 acres* | None (None) *982 acres* | None (None) | None (None) | 121 acres (121 acres) | None (None) | None (None) |
| Black-footed Ferret (Endangered) | Unknown acres | Unknown acres | Unknown acres | Unknown acres | Unknown acres | Unknown acres | Unknown acres | Unknown acres | None | None | None | None | None |
| Bald Eagles (Endangered) | Unknown acres | Unknown | Unknown | Unknown acres | Unknown acres | Unknown acres | Unknown acres | Unknown acres | Unknown acres | Unknown acres | Unknown acres | Unknown acres | Unknown acres |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| San Joaquin Kit Fox (Endangered) | None | None | Unknown acres | None | None | None | None | None | None | None | None | None | None |
| Blunt-nosed Leopard Lizard (Endangered) | None | None | Unknown acres | None | None | None | None | None | None | None | None | None | None |
| Railroad Valley Springfish (Candidate for Endangered) | None | None | None | None | Unknown acres of spring habitat | None | None | None | None | None | None | None | None |
| **SOILS**[5] | | | | | | | | | | | | | |
| Soils Most Susceptible to More Occurrences of Slides, High Erosion Hazards, and Other Limitations Associated with Project Construction and Restoration (Soil Group 1-8) | *3,056 acres* | 279 acres (3,056 acres) *279 acres* | 1,090 acres (3,056 acres) *1,090 acres* | 599 acres (575 acres) *3,056 acres* | 4,884 acres (1,692 acres) *6,157 acres* | 621 acres (367 acres) *3,309 acres* | 2,532 acres (423 acres) *3,649 acres* | 902 acres (927 acres) *2,533 acres* | 230 acres (206 acres) | 206 acres (255 acres) | 169 acres (73 acres) | 255 acres (158 acres) | 588 acres (521 acres) |
| Soil Group 1--Soils of Mountain Areas with Precipitation of 14 to 28 Inches, Most susceptible to Slides and High Erosion Hazards (Part of the above total)[6] | *1,382 acres* | 36 acres (1,382 acres) *36 acres* | 36 acres (1,382 acres) *36 acres* | 262 acres (259 acres) *1,382 acres* | 0 acres (148 acres) *1,236 acres* | 0 acres (51 acres) *1,309 acres* | 302 acres (1,314 acres) *376 acres* | 281 acres (927 acres) *739 acres* | 230 acres (206 acres) | None (None) | None (None) | 255 acres (158 acres) | 558 acres (521 acres) |
| Soil Group 9--Soils with Annual Precipitation Generally less than 8 to 10 Inches (Significant to Revegetation Potential) | *2,811 acres* | 145 acres (2,811 acres) *145 acres* | 497 acres (2,811 acres) *497 acres* | 250 acres (404 acres) *2,945 acres | 6,823 acres (2,811 acres) *7,005 acres* | 999 acres (404 acres) *3,394 acres* | 2,326 acres (404 acres) *4,739 acres* | None (None) *2,811 acres* | None (None) | 715 acres (667 acres) | 169 acres (169 acres) | None (None) | None (None) |
| **VISUAL RESOURCES** | | | | | | | | | | | | | |
| Acres Which Would Exceed Acceptable Levels of Visual Contrast Based upon VRM Classes and VQO[7] | | | | | | | | | | | | | |
| Class 1/ Preservation | *None* | None (None) *None* | None (None) *None* | None (None) *None* | None (None) *None* | None (None) *None* | None (None) *None* | None (None) *None* | None (None) | None (None) | None (None) | None (None) | None (None) |
| Class 2/Retention | *606 acres* | None (606 acres) *None* | None (606 acres) *None* | 121 acres (36 acres) *702 acres* | 519 acres (97 acres) *1,030 acres* | None (36 acres) *369 acres* | 146 acres (544 acres) *206 acres* | 527 acres (229 acres) *897 acres* | 121 (24 acres) | 182 acres (None) | None (None) | 73 acres (None) | 364 acres (206 acres) |
| Class 3/Partial Retention | *573 acres* | None (573 acres) *None* | None (573 acres) *None* | 24 acres (146 acres) *453 acres* | 229 acres (339 acres) *476 acres* | None (None) *575 acres* | None (230 acres) *344 acres* | 36 acres (230 acres) *381 acres* | 158 acres (None) | 60 acres (121 acres) | None (None) | None (None) | None (85 acres) |
| Class 4/ Modification and Maximum Modification | *15 acres* | 15 acres (15 acres) *15 acres* | 15 acres 15 acres) *15 acres* | 36 acres (None) *51 acres* | 12 acres (None) *27 acres* | 15 acres (15 acres) *15 acres* | None (None) *15 acres* | None (None) *15 acres* | None (None) | None (None) | None (None) | None (None) | None (None) |

TABLE 2-11—Continued

**COMPARATIVE ANALYSIS OF IMPACTS FROM PROPOSED ACTION, ALTERNATIVES AND VARIATIONS**

| Resources | Proposed Action | Alternative A, Northern Systems | | Alternative B, Sanpete Valley | Alternative C, Central Nevada | Alternative D, Sevier-Escalante Desert | Alternative E, West Salt Lake | Alternative F, Provo Canyon | Variation 2, Thistle Creek | Variation 3, East Las Vegas | Variation 4, Fort Mojave | Variation 5, Mill Creek | Variation 6, Daniels Canyon |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Best Case[1] | Worst Case[1] | | | | | | | | | | |
| **LAND USES: RECREATION** | | | | | | | | | | | | | |
| Managed Sites Crossed | *4 sites--Strawberry Reservoir Recreation Area, Las Vegas Sand Dunes Recreation Area, proposed Frenchman Mountain-Rainbow Gardens National Natural Landmark (includes Sunrise Mountain Natural Area), and proposed Clark County Wet Lands Park* | None<br>(4 sites--Strawberry Reservoir Recreation Area, Las Vegas Sand Dunes Recreation Area, proposed Frenchman Mountain-Rainbow Gardens National Natural Landmark (includes Sunrise Mountain Natural Area), and proposed Clark County Wet Lands Park)<br>*None* | None<br>(4 sites--Strawberry Reservoir Recreation Area, Las Vegas Sand Dunes Recreation Area, proposed Frenchman Mountain-Rainbow Gardens National Natural Landmark (includes Sunrise Mountain Natural Area), and proposed Clark County Wet Lands Park)<br>*None* | None<br>(None)<br>*4 sites--Strawberry Reservoir Recreation Area, Las Vegas Sand Dunes Recreation Area, proposed Frenchman Mountain-Rainbow Gardens National Natural Landmark (includes Sunrise Mountain Natural Area), and the proposed Clark County Wet Lands Park* | None<br>(3 sites--Las Vegas Sand Dunes Recreation Area, proposed Frenchman Mountain-Rainbow Gardens National Natural Landmark (includes Sunrise Mountain Natural Area), and the proposed Clark County Wet Lands Park)<br>*1 site--Strawberry Reservoir Recreation Area* | None<br>(None)<br>*4 sites--Strawberry Reservoir Recreation Area, Las Vegas Sand Dunes Recreation Area, proposed Frenchman Mountain-Rainbow Gardens National Natural Landmark (includes Sunrise Mountain Natural Area), and the proposed Clark County Wet Lands Park* | 1 site--Emigration Campground<br>(1 site--Strawberry Reservoir Recreation Area)<br>*4 sites--Emigration Campground, Las Vegas Sand Dunes Recreation Area, proposed Frenchman Mountain-Rainbow Gardens National Natural Landmark (includes Sunrise Mountain Natural Area), and the proposed Clark County Wet Lands Park* | None<br>(1 site--Strawberry Reservoir Recreation Area)<br>*3 sites--Las Vegas Sand Dunes Recreation Area, proposed Frenchman Mountain-Rainbow Gardens National Natural Landmark (includes Sunrise Mountain Natural Area), and the proposed Clark County Wet Lands Park* | None<br>(None) | 1 site--Las Vegas Sand Dunes Recreation Area<br>(3 sites--Las Vegas Sand Dunes Recreation Area, proposed Frenchman Mountain-Rainbow Gardens National Natural Landmark (includes Sunrise Mountain Natural Area), and the proposed Clark County Wet Lands Park) | None<br>(None) | None<br>(None) | 1 site--Strawberry Reservoir Recreation Area- Significant impacts<br>(1 site--Strawberry Reservoir Recreation Area--Less Significant impacts. |
| ORV Events | *1 known event-Mint 400* | None<br>(1 known event-Mint 400)<br>*None* | None<br>(1 known event-Mint 400)<br>*None* | None<br>(None)<br>*1 known event-Mint 400* | None<br>(Mint 400)<br>*None* | None<br>(None)<br>*Mint 400* | None<br>(None)<br>*Mint 400* | None<br>(None)<br>*Mint 400* | None<br>(None) | None<br>(None) | None<br>(None) | None<br>(None) | None<br>(None) |
| **LAND USES: WILDERNESS** | | | | | | | | | | | | | |
| | None<br>(None)<br>*None* | None<br>(None)<br>*None* | None<br>(None)<br>*None* | None<br>(None)<br>*None* | 2 direct WSA conflicts--Notch Peak WSA (U-050-078), Rawhide Mountains (NV-060-059)<br>(None)<br>*2 direct WSA conflicts--Notch Peak WSA (U-050-078), Rawhide Mountains WSA (NV-060-059)* | None<br>(None)<br>*None* | None<br>(None)<br>*None* | None<br>(None)<br>*None* | None<br>(None) | None<br>(None) | None<br>(None) | None<br>(None) | None<br>(None) |
| **LAND USES: AGRICULTURE*** | | | | | | | | | | | | | |
| Acres of Cropland Temporarily Disturbed | *1,065 acres* | 521 acres<br>(1,065 acres)<br>*521 acres* | 1,065 acres<br>(1,065 acres)<br>*1,065 acres* | 1,125 acres<br>(605 acres)<br>*1,585 acres* | 944 acres<br>(351 acres)<br>*1,295 acres* | 557 acres<br>(605 acres)<br>*1,016 acres* | 653 acres<br>(666 acres)<br>*1,053 acres* | 363 acres<br>(230 acres)<br>*1,198 acres* | 61 acres<br>(None) | None<br>(None) | None<br>(None) | None<br>(None) | 73 acres<br>(None) |
| Acres of Cropland Permanently Removed from Production | *5 acres* | None<br>(5 acres)<br>*None* | None<br>(5 acres)<br>*None* | 5 acres<br>(None)<br>*5 acres* | 5 acres<br>(None)<br>*5 acres* | 5 acres<br>(None)<br>*5 acres* | 5 acres<br>(5 acres)<br>*5 acres* | 5 acres<br>(None)<br>*5 acres* | None<br>(None) | None<br>(None) | None<br>(None) | None<br>(None) | None<br>(None) |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LAND USES: FOREST RESOURCES** | | | | | | | | | | | | | |
| Commercial Timber in thousand board feet (Mbf) | *1,016 Mbf* *$16,115* | None (1,016 Mbf) ($16,115) *None* | None (1,065 mbf) (16,115) *None* | None (None) *1,016 Mbf* *$16,115* | None (None) *1,016 Mbf* *$16,115* | None (None) *1,016 Mbf* *$16,115* | 42 Mbf $663 (1,016 Mbf) $16,115) *42 Mbf* *$875* | 10 Mbf $220 (1,016 Mbf) ($16,115) *10 Mbf* *$220* | None (None) | None (None) | None (None) | 1,167 Mbf $25,685 (460 Mbf) ($10,124) | None (287 Mbf) ($4,945) |
| Cords of Firewood* | *3,570 cords* *$7,140* | None (3,570 cords) (7,140) *None* | None (3,570 cords) ($7,140) *None* | 1,814 cords $3,628 (848 cords) ($1,696) *11,580 cords* *$23,160* | 5,800 cords $11,600 (3,420 cords) ($16,840) *6,120 cords* *$12,240* | 480 cords $960 (3,420 cords) ($6,840) *4,305 cords* *$8,610* | 5,330 cords $10,600 (2,424 cords) ($4,848) *8,060 cords* *$16,120* | 1,200 cords $2,400 (480 cords) ($960) *5,275 cords* *$10,550* | 545 cords $1,090 (40 cords) ($80) | None (None) | None (None) | 144 cords $288 (60 cords) ($120) | 218 cords $436 (60 cords) ($120) |
| **LAND USES: Conflicts with Land Use Plans, Controls, and Constraints** | *Would not coincide with the Utility Corridor Rule in the proposed Forest Land Management Plan for the Uinta National Forest. The proposed action would not follow the 3,000-foot wide BLM corridor through the 70,000 acres of BLM lands transferred to the Moapa Indian Reservation. BLM policy is to follow the corridor wherever possible.* | No known conflicts. (The proposed action would not follow the 3,000 foot wide BLM corridor through the 70,000 acres transferred to the Moapa Indian Reservation. BLM policy is to follow the corridor whenever possible. The proposed action would conflict with the Utility Corridor Rule in the proposed Forest Land Management Plan for the Uinta National Forest.) *No known conflicts.* | No known conflicts. (The proposed action would not follow the 3,000-foot wide BLM corridor through the 70,000 acre of BLM lands transferred to the Moapa Indian Reservation. BLM, policy is to follow the corridor wherever possible. The proposed action would conflict with the Utility Corridor Rule in the proposed Forest Land Management Plan for the Uinta National Forest.) *No Known Conflicts.* | No known conflicts. (No known conflicts.) *Would not follow the 3,000-foot wide BLM corridor through the 70,000 acres of BLM lands transferred to the Moapa Indian Reservation. BLM policy is to follow the corridor whenever possible. Would not coincide with the Utility Corridor Rule in the proposed Forest Land Management Plan for the Uinta National Forest.* | Would not follow the Utility Corridor designated in the BLM California Desert Plan. Would follow a contingency corridor. Would not follow the transmission utilities corridor of the BLM draft Benton-Owens Valley MFP. (The proposed action would not follow the 3,000-foot wide BLM utility corridor through the 70,000 acres of BLM lands transferred to the Moapa Indian Reservation. BLM policy is to follow the corridor whenever possible.) *Would conflict with the Utilities Corridor Rule of the proposed Forest Land Management Plan for the Uinta National Forest. Would not follow the utility corridor designated in the BLM California Desert Plan. Would follow a contingency planning corridor. Would not follow the transmission utilities corridor of the BLM draft Benton-Owens Valley MFP* | No known conflicts. (No known conflicts.) *Would conflict with the Utility Corridor Rule of the proposed Forest Land Management Plan for the Uinta National Forest. Would not follow the 3,000-foot wide BLM corridor through the 70,000 acres of BLM lands transferred to the Moapa Indian Reservation. BLM policy is to follow the corridor whenever possible.* | No known conflicts. (The proposed action would conflict with the Utility Corridor Rule of the proposed Forest Land Management Plan for the Uinta National Forest.) *The proposed action would not follow the 3,000-foot wide BLM utility corridor through the 70,000 acres of BLM lands transfered to the Moapa Indian Reservation. BLM policy is to follow the corridor whenever possible.* | No known conflicts. (The proposed action would conflict with the Utility Corridor Rule of the proposed Forest Land Management Plan for the Uinta National Forest.) *The proposed action would not follow the 3,000-foot wide BLM corridor through the 70,000 acres of BLM lands transfered to the Moapa Indian Reservation. BLM policy is to follow the corridor whenever possible.* | No known conflicts. (Would not coincide with the Utility Corridor Rule of the proposed Forest Land Management Plan for the Uinta National Forest.) | No known conflicts. (No known conflicts) | No known conflicts. (No known conflicts) | No known conflicts. (Would conflict with the Utility Corridor Rule of the proposed Forest Land Management Plan for the Uinta National Forest.) | Would not be in a designated corridor based on all of the criteria in the Utility Corridor Rule in the proposed Forest Land Management Plan for the Uinta National Forest. (Would conflict with the Utility Corridor Rule proposed in the Forest Land Management Plan for the Uinta National Forest.) |

TABLE 2-11—Continued

**COMPARATIVE ANALYSIS OF IMPACTS FROM PROPOSED ACTION, ALTERNATIVES AND VARIATIONS**

| Resources | Proposed Action | Alternative A, Northern Systems | | Alternative B, Sanpete Valley | Alternative C, Central Nevada | Alternative D, Sevier-Escalante Desert | Alternative E, West Salt Lake | Alternative F, Provo Canyon | Variation 2, Thistle Creek | Variation 3, East Las Vegas | Variation 4, Fort Mojave | Variation 5, Mill Creek | Variation 6, Daniels Canyon |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Best Case[1] | Worst Case[1] | | | | | | | | | | |
| **SOCIO-ECONOMICS** | | | | | | | | | | | | | |
| Construction Crews Requiring Over 10 Percent of Available Housing | *Compressor Station--1; Pipeline Spread--1; Double-Jointing Yards--3* | Compressor Stations--2; Pipeline Spread--1; Double-Jointing Yards not evaluated (Compressor Station--1; Pipeline Spread--1; Double-Jointing Yards--3) | Compressor Stations--2; Pipeline Spread--1; Double-Jointing Yards not evaluated (Comperssor Station--1; Pipeline Spread--1; Double-Jointing Yards--3) | Double-Jointing Yard--1 (Double-Jointing Yard--1) | Pipeline Spreads--5; Double-Jointing Yards and Communication Crews not evaluated (Pipeline Spread--1; Double-Jointing Yards--2) | No significant requirment (no significant requirement) | Compressor Station--1; Pipeline Spreads--4; Double-Jointing Yards and Communication Crew not evaluated (Pipeline Spreads--3; Double-Jointing Yard--1) | Pipeline Spread--1; Double-Jointing Yard--1 (Double-Jointing Yard--1) | No significant requirement (No significant requirement) | No significant requirement (No significant requirement) | Pipeline Spread--1 (Pipeline Spread--1) | No significant requirement (No significant requirement) | No significant requirement (No significant requirement) |
| Construction Worker Spending Increasing Regional Retail Sales More Than 10 Percent | *No significant increase* | No significant increase (No significant increase) | No significant increase (No significant increase) | No significant increase (No significant increase) | Pipeline Spreads--3; Double-Jointing Yards and Communication Crews not evaluated (No significant increase) | No significant increase (No significant increase) | Pipeline Spread--1 (No significant increase) | No significant increase (No significant increase) | No significant increase (No significant increase) | No significant increase (No significant increase) | No significant increase (No significant increase) | No significant increase (No significant increase) | No significant increase (No significant increase) |
| Total Property Tax: First Year of Operation | *$4,960,000* | Not quantified. However tax would probably be less than RMPP because there would be fewer facilities. ($4,960,000) | Not quantified. However, tax would probably be less because there would be fewer facilities. ($4,960,000) | $1,537,000 ($1,531,000) | Not quantified. However, tax probably greater than RMPP because there would be more facilities. ($43,182,000) | $1,550,000 ($1,454,000) | $1,393,000 ($2,315,000) | $1,165,000 ($967,000) | $312,000 ($252,000) | $1,001,000 ($980,000) | 980,000 ($980,000) | $241,000 ($175,000) | $512,000 ($584,000) |
| Demand on Fire Protection During Construction | *No significant demand.* | No significant demand (No significant demand) | No significant demand (No significant demand) | No significant demand (No significant demand) | Because new housing would probably be constructed to house the construction crews, there would be an increased need for fire protection. (No significant demand) | No significant demand (No significant demand) | No significant demand (No significant demand) | No significant demand (No significant demand) | No significant demand (No significant demand) | No significant demand (No significant demand) | No significant demand (No significant demand) | No significant demand (No significant demand) | No significant demand (No significant demand) |
| **CULTURAL RESOURCES** | | | | | | | | | | | | | |
| Number of Acres with High Site Density | *4,545 acres* | 931 acres (4,545 acres) *931 acres* | 1,537 acres (4,545 acres) *1,537 acres* | 2,121 acres (1,515 acres) *4,480 acres* | 4,235 acres (2,723 acres) *6,050 acres* | 1,515 acres (1,210 acres) *6,050 acres* | 1,863 acres (1,818 acres) *3,984 acres* | 1,210 acres (908 acres) *4,840 acres* | 326 acres (242 acres) | 714 acres (678 acres) | 121 acres (121 acres) | 254 acres (157 acres) | 630 acres (581 acres) |
| Number of Acres with High Site Significance | *1,515 acres* | None (1,515 acres) *None* | 605 acres (1,515 acres) *605 acres* | 1,818 acres (906 acres) *2,420 acres* | 606 acres (303 acres) *908 acres* | 606 acres (606 acres) *1,515 acres* | 303 acres (606 acres) *1,210* | 606 acres (303 acres) *1,818 acres* | None (None) | 303 acres (None) | 121 acres (121 acres) | None (None) | None (None) |
| **GEOLOGY/ TOPOGRAPHY** | | | | | | | | | | | | | |
| Faults Crossed | *8* | 3 (8) | 6 (8) | Many (7) | 23 (6) | 1 (6) | 7 (7) | 1 (3) | None (1) | None (None) | None (None) | 1 (1) | None (None) |
| Miles Parallel To Faults | *10 miles* | None (10 miles) | None (10 miles) | 165 miles (10 miles) | 146 miles (10 miles) | None (10 miles) | None (10 miles) | 8 miles (None) | None (None) | None (None) | None (None) | None (None) | None (None) |
| Miles of Route Over 0.1g | *255 miles* | 46 miles (255 miles) | 194 miles (255 miles) | 145 miles (125 miles) | 486 miles 105 miles) | 100 miles (105 miles) | 326 miles (255 miles) | 115 miles (106 miles) | 27 miles (20 miles) | None (None) | None (None) | 21 miles (13 miles) | 52 miles (48 miles) |
| Miles of Liquefaction Potential | *19 miles* | Unknown (19 miles) | Unknown (19 miles) | 115 miles (19 miles) | Unknown (19 miles) | 18 miles (19 miles) | More than 127 miles (19 miles) | 5 miles (10 miles) | None (None) | None (None) | None (None) | None (None) | None (None) |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Miles of Volcanic Flows | *50 miles* | 21 miles (50 miles) | 21 miles (50 miles) | None (50 miles) | 60 miles (50 miles) | 60 miles (50 miles) | 2 miles (5 miles) | None (None) | None (None) | None (None) | None (None) | None (None) | None (None) |
| Miles of Landslide Potential | *17 miles* | None (17 miles) | 15 miles (17 miles) | None (2 miles) | more than 34 miles (None) | None (None) | None (17 miles) | 3 miles (17 miles) | 3 miles (10 miles) | None (None) | None (None) | 8 miles (10 miles) | 9 miles (5 miles) |
| Miles of Side Slope Greater Than 30% | *22 miles* | 1 mile (22 miles) | 1 mile (22 miles) | 8 miles (None) | 5 miles (3 miles) | None (None) | 5 miles (19 miles) | 6 miles (13 miles) | 4 miles (4 miles) | None (None) | None (None) | 6 miles (4 miles) | 11 miles (1 mile) |
| Number of Slopes Crossed of Over 100% | *3* | None (3) | None (3) | None (1) | None (3) | None (1) | None (None) | 1 (None) | None (None) | None (None) | None (None) | None (None) | None (None) |
| **WATER RESOURCES** | | | | | | | | | | | | | |
| Total Stream Crossings | *61* | 10 (61) *10* | 36 (61) *36* | 34 (10) *85* | 52 (24) *88* | 12 (9) *64* | 23 (44) *45* | 9 (17) *53 | 7 (4) | 2 (3) | 1 (1) | 1 (1) | 7 (11) |
| Intermittent Stream Crossings[11] | *32* | *3* | *18* | *41* | *44* | *29* | *20* | *28* | *5* | *2* | *1* | *1* | *2* |
| Perennial Stream Crossings[11] | *29* | *7* | *18* | *44* | *44* | *35* | *25* | *25* | *2* | *None* | *None* | *None* | *5* |
| Class I Stream Crossings[11] | *3* | *None* | *None* | *3* | *2* | *3* | *1* | *3* | *None* | *None* | *None* | *None* | *1* |
| Class II Stream Crossings[11] | *9* | *None* | *None* | *8* | 11* | *9* | *1* | *2* | *None* | *None* | *None* | *1* | *3* |
| Class III Stream Crossings[11] | *5* | *4* | *5* | *11* | *5* | *5* | *4* | *5* | *2* | *None* | *None* | *None* | *1* |
| Class IV Stream Crossings[11] | *2* | *None* | *1* | *4* | *4* | *4* | *5* | *1* | *1* | *None* | *None* | *None* | *None* |
| Unclassified Stream Crossings[11] | *42* | *6* | *30* | *59* | *66* | *43* | *34* | *42* | *4* | *2* | *1* | *None* | *3* |
| **AIR QUALITY** | | | | | | | | | | | | | |
| Dust | *Temporary increase in dust during construction* | Temporary increase in dust during construction | Temporary increase in dust during construction | Temporary increase in dust during construction | Temporary increase in dust during construction | Temporary increase in dust during construction | Temporary increase in dust during construction | Temporary increase in dust during construction | Temporary increase in dust during construction | Temporary increase in dust during construction | Temporary increase in dust during construction | Temporary increase in dust during construction | Temporary increase in dust during construction |
| Total $NO_x$ Emissions | *[12]404 tons per year* | [13]5 tons per year (404 tons per year) | [14]268 tons per year (404 tons per year) | 404 tons per year (404 tons per year) | [15]326 tons per year (404 tons per year) | 404 tons per year (404 tons per year) | [16]297 tons per year (404 tons per year) | 404 tons per year (404 tons per year) | 404 tons per year (404 tons per year) | 404 tons per year (404 tons per year) | 404 tons per year (404 tons per year) | 404 tons per year (404 tons per year) | 404 tons per year (404 tons per year) |
| Total CO Emissions | *153 tons per year* | 2 tons per year (153 tons per year) | 99 tons (153 tons per year) | 153 tons per year (153 tons per year) | 124 tons per year (153 tons per year) | 153 tons per year (153 tons per year) | 112 tons per year (153 tons per year) | 153 tons per year (153 tons per year) | 153 tons per year (153 tons per year) | 153 tons per year (153 tons per year) | 153 tons per year (153 tons per year) | 153 tons per year (153 tons per year) | 153 tons per year (153 tons per year) |
| Maximum Ground-level Concentration of $NO_x$ | *23.27 ug per cubic meter* | Negligible (23.27 ug per cubic meter) | [17]44 ug per cubic meter (23.27 ug per cubic meter) | 23.27 ug per cubic meter (23.27 ug per cubic meter) | 22.63 ug per cubic meter (23.27 ug per cubic meter) | 23.27 ug per cubic meter (23.27 ug per cubic meter) | 22.4 ug per cubic meter (23.27 ug per cubic meter) | 23.27 ug per cubic meter (23.27 ug per cubic meter) | 23.27 ug per cubic meter (23.27 ug per cubic meter) | 23.27 ug per cubic meter (23.27 ug per cubic meter) | 23.27 ug per cubic meter (23.27 ug per cubic meter) | 23.27 ug per cubic meter (23.27 ug per cubic meter) | 23.27 ug per cubic meter (23.27 ug per cubic meter) |
| Maximum Ground-level Concentrations of CO | *24.6 ug per cubic meter (1 hour) and 17.2 per cubic meter (8 hours)* | Negligible (24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours)) | [17]116 ug per cubic meter (1 hour) and 81 ug per cubic meter (8 hours) (24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours)) | 24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours) (24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours)) | 19.84 ug per cubic meter (1 hour) and 13.88 ug per cubic meter (8 hours) (24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours)) | 24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours) (24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours)) | 18.06 ug per cubic meter (1 hour) and 12.64 ug per cubic meter (8 hours) (24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours)) | 24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours) (24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours)) | 24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours) (24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours)) | 24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours) (24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours)) | 24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours) (24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours)) | 24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours) (24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours)) | 24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours) (24.6 ug per cubic meter (1 hour) and 17.2 ug per cubic meter (8 hours)) |
| PSD Review Required | *Sage Compressor Station* | None (Sage Compressor Station) | Ione and Delevan Compressor Stations (Sage Compressor Station) | Sage Compressor Station (Sage Compressor Station) | Sage Compressor Station (Sage Compressor Station) | Montpelier Compressor Station (Sage Compressor Station) | Sage Compressor Station (Sage Compressor Station) | Sage Compressor Station (Sage Compressor Station) | Sage Compressor Station (Sage Compressor Station) | Sage Compressor Station (Sage Compressor Station) | Sage Compressor Station (Sage Compressor Station) | Sage Compressor Station (Sage Compressor Station) | Sage Compressor Station (Sage Compressor Station) |

TABLE 2-11—Continued

**COMPARATIVE ANALYSIS OF IMPACTS FROM PROPOSED ACTION, ALTERNATIVES AND VARIATIONS**

| Resources | Proposed Action | Alternative A, Northern Systems | | Alternative B, Sanpete Valley | Alternative C, Central Nevada | Alternative D, Sevier-Escalante Desert | Alternative E, West Salt Lake | Alternative F, Provo Canyon | Variation 2, Thistle Creek | Variation 3, East Las Vegas | Variation 4, Fort Mojave | Variation 5, Mill Creek | Variation 6, Daniels Canyon |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Best Case[1] | Worst Case[1] | | | | | | | | | | |
| NAAQS | *The NAAQS would not be exceeded.* | The NAAQS would not be exceeded. | The NAAQS would not be exceeded. | The NAAQS would not be exceeded. | The NAAQS would not be exceeded. | The NAAQS would not be exceeded. | The NAAQS would not be exceeded. | The NAAQS would not be exceeded. | The NAAQS would not be exceeded. | The NAAQS would not be exceeded. | The NAAQS would not be exceeded. | The NAAQS would not be exceeded. | The NAAQS would not be exceeded. |
| **NOISE QUALITY** | | | | | | | | | | | | | |
| Operation $L_{eq}$ | *44.8 dB(A)* | Noise data for the Stanfield Compressor Station are not available. (44.8 dB(A)) | Noise data for the Stanfield Compressor Station are not available. 3 dB(A) increase for each doubling of horsepower if similar units are installed. (44.8 dB(A)) | 44.8 dB(A) (44.8 dB(A)) | 44.8 dB(A) (44.8 dB(A)) | 44.8 dB(A) (44.8 dB(A)) | 44.8 dB(A) (44.8 dB(A)) | 44.8 dB(A) (44.8 dB(A)) | 44.8 dB(A) (44.8 dB(A)) | 44.8 dB(A) (44.8 dB(A)) | 44.8 dB(A) (44.8 dB(A)) | 44.8 dB(A) (44.8 dB(A)) | 44.8 dB(A) (44.8 dB(A)) |
| Operation $L_{dn}$ | *51.2 dB(A)* | 51.2 dB(A) (51.2 dB(A)) | 51.2 dB(A) (51.2 dB(A)) | 51.2 dB(A) (51.2 dB(A)) | 51.2 dB(A) (51.2 dB(A)) | 51.2 dB(A) (51.2 dB(A)) | 51.2 dB(A) (51.2 dB(A)) | 51.2 dB(A) (51.2 dB(A)) | 51.2 dB(A) (51.2 dB(A)) | 51.2 dB(A) (51.2 dB(A)) | 51.2 dB(A) (51.2 dB(A)) | 51.2 dB(A) (51.2 dB(A)) | 51.2 dB(A) (51.2 dB(A)) |
| **SAFETY** | | | | | | | | | | | | | |
| Incidents Per Year | *0.85* | 0.10 (0.85) | 0.32 (0.85) | 0.88 (0.85) | 1.08 (0.85) | 0.87 (0.85) | 1.08 (0.85) | 0.87 (0.85) | 0.86 (0.85) | 0.86 (0.85) | 0.85 (0.85) | 0.86 (0.85) | 0.86 (0.85) |

NOTE: The information presented in this table for the proposed action, alternatives, and variations indicates total impacts to each resource category. For each alternative, the table shows three types of information: the impacts from the alternative only; in parentheses, the impacts for that portion of the RMPP which would be replaced by the alternative; and finally, symbolized by asterisks, the impacts for the total alternative pipeline system Wyoming to California.

NOTE: The abbreviations and acronyms used in this table are identified in the glossary.

[1]Best Case--76.8 miles of pipeline construction; no pipeline required in California. Worst Case--225.1 miles of pipeline construction; 148.3 miles of pipeline required in California.

[2]Vegetation includes all vegetation types and barren land, but not cropland.

[3]Riparian acres are estimated by multiplying a standard width of 100 feet by an average 100 foot riparian zone by the number of stream crosssings.

[4]All impacts noted in the wildlife section are potential impacts to habitat except those to desert tortoise, which are to the animal.

[5]These are general groups of soils containing specific areas that warrant more intensive implementation of erosion control and restoration precedures to minimize soil erosion and potential impacts.

[6]Soil Group 1 is included in the previous total but is highlighted because it contains the most frequent occurrences of server erosion hazard and slide potential.

[7]Acres of visual resources impact are totaled for the pipeline only.

[8]Temporary disturbance of cropland along the right-of-way would be restored within 1 to 2 years. Lands would be permanently removed from production for the life of the project because surface facilities located within cropland would permanently remove that land from production for the life of the project.

[9]A cord is a volume of wood 4 feet high by 4 feet wide by 8 feet long. Cords of fuel wood are valued at $2 per cord, minimum price. Actual value may be more nearly $26 commercial or $110 retail per cord.

[10]Based on estimates of known cultural resources only. Field surveys will be conducted after a route is selected and centerline staked.

[11]Totals only are given for the various classifications of streams. They apply to the total length of the alternative pipeline system, including those portions of the proposed action north and/or south of each alternative which would be necessary to move the gas from Wyoming to California.

[12]Total installed horsepower of 31,800. Emission figures represent total potential to emit.

[13]This requires the construction of a 400-hp. compressor station at Stanfield.

[14]This requires the installation of the following compression: 400 horsepower at Stanfield, 8,975 horsepower at Ione, 14,450 horsepower at Madras, 11,375 horsepower at Bonanza, and 8,750 horsepower at Delevan.

[15]The Central Nevada Alternative requires installation of 25,650 horsepower of compression at the Sage Compressor Station.

[16]The West Salt Lake Alternative requires the installation of 23,350 horsepower of compression at the Montpelier Compressor Station.

[17]Figures are for Ione, which of all of the compressor stations on the alternative, would emit the most $NO_x$

TABLE 2-12

EFFICIENCY ANALYSIS OF PROPOSED ACTION, ALTERNATIVES AND VARIATIONS

| System Requirements | Proposed Action | Alternative A, Northern Systems | | Alternative B, Sanpete Valley | Alternative C, Central Nevada | Alternative D, Sevier-Escalante Desert | Alternative E, West Salt Lake | Alternative F, Provo Canyon | Variation 2, Thistle Creek | Variation 3, East Las Vegas | Variation 4, Fort Mojave | Variation 5, Mill Creek | Variation 6, Daniels Canyon |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Best Case[a] | Worst Case[b] | | | | | | | | | | |
| Fuel Use (Mcfd) | [c]2,910 | [d]17,160<br>[e]27,620 | [d]17,160<br>[e]27,620 | 2,910 | 3,520 | 2,910 | [f]1,320 | 2,910 | If substituted for portion of the RMPP, this variation would not change fuel use or compression. | If substituted for portion of the RMPP, this variation would not change fuel use of compression. | If substituted for portion of the RMPP, this variation would not change fuel use or compression. | If substituted for portion of the RMPP, this variation would not change fuel use or compression. | If substituted for portion of the RMPP, this variation would not change fuel use or compression. |
| Fuel Efficiency | 99.3% | 95.8% | 93.3% | 99.3% | 99.1% | 99.3% | 99.2% | 99.3% | 99.3% | 99.3% | 99.3% | 99.3% | 99.3% |
| Compression (Additional Horsepower) | [g]21,200 | [h]400<br>[i]21,600 | [h]400<br>[i]21,600 | 21,200 | 25,650 | 21,200 | 23,350 | 21,200 | 21,200 | 21,200 | 21,200 | 21,200 | 21,200 |
| Length (Miles) | 610.18 | [h]76.8 | [h]225.1 | 630 | 862 | 622 | 747 | 619 | 27 miles would replace 20-mile-long segment of RMPP | 59 miles would replace 56-miles long segment of RMPP | 10 miles would replace 10-mile-long segment of RMPP | 21 miles would replace 13-mile-long segment of RMPP | 52 miles would replace 48-mile-long segment of RMPP |

Note: The abbreviations and acronyms used in this table are identified in the glossary.

[a]Best Case--76.8 miles of pipeline construction; no pipeline required in California.

[b]Worst--225.1 miles of pipeline construction· 148.3 miles of pipeline required in California.

[c]Does not include fuel used on Northwest's system to transport Canadian gas (90,000 Mcfd) or other RMPP gas obtained between Stanfield, Oregon, and Sage, Wyoming.

[d]Does not include fuel use/savings on Northwest system from shortened transportation of Canadian gas (90,000 Mcfd). Portion of Western Leg of the ANGTS prebuilt, no Alaskan gas flowing.

[e]Does not include fuel use/savings on Northwest system from shortened transportation of Canadian gas (90,000 Mcfd). Western Leg completed, Alaskan gas flowing.

[f]Does not include fuel use on Northwest's system between Kemmerer and Montpelier Compressor Stations.

[g]Three 10,600-hp. units would be installed. One unit would be used as a spare.

[h]Portions of Western Leg prebuilt (380 miles).

[i]Western Leg completed.

## Proposed Action

Although it would temporarily disturb 6,330 acres of native vegetation, the proposed action would not cross unique or extremely sensitive vegetation types except for 3 miles of Rocky Mountain red cedar (*Juniperus scopulorum*) which is unique for the area. The proposed route could cross habitat of eight species of plants which are federally listed or candidates for listing as threatened or endangered. Neither the proposed action nor any of the alternatives would cross significant acres of riparian vegetation. That which would be crossed would recover very quickly.

The proposed action would cross many miles of various sensitive wildlife habitats including big game winter range, desert bighorn sheep range, waterfowl nesting areas, sage grouse habitat, golden eagle nesting areas, and state-listed desert tortoise habitat. However, none would be significantly affected if construction were to be timed to avoid certain areas as identified in the mitigation measures in appendix C. The proposed route would cross an unquantifiable acreage of potential endangered black-footed ferret habitat and bald eagle habitat.

The proposed action would disturb 3,056 acres of soils which have characteristics most susceptible to slides, high erosion hazards, and other limitations. It would cross 1,382 acres of the most sensitive of these, Soil Group 1, which occurs in mountainous areas. However, with implementation of the Erosion Control, Restoration, and Revegetation Guidelines presented in appendix C, all but a few problem areas would be stabilized and rehabilitated within 3 years. The severity of potential impacts to Soil Group 1 is under continuing study as the Forest Service is concerned that the impacts may be more severe than have been calculated in the EIS. Any changes in conclusions as a result of the studies will be included in the final EIS.

The proposed action would create visual resource Class 2 contrast ratings on 606 acres, Class 3 contrast ratings on 573 acres, and Class 4 contrast ratings on 15 acres. Even with mitigation, some contrasts would remain.

The proposed action would conflict with four managed recreation sites and one off-road vehicle (ORV) event. Impacts to three of these, the Mint 400 ORV race, the proposed Frenchman Mountain-Rainbow Gardens National Natural Landmark, and the proposed Clark County Wetlands Park would be of moderate significance; two, the Strawberry Reservoir Recreation Area and the Las Vegas Sand Dunes Recreation Area would be of lesser significance.

The proposed action would temporarily disturb 1,065 acres of cropland, however such impacts would not last over one agricultural season. The proposed route would also permanently remove 5 acres of cropland from production.

The proposed action would conflict with the Utility Corridor Rule proposed in the Forest Land Management Plan for the Uinta National Forest. This would violate the intent of the draft plan in designating lands suitable for utility corridors. However, the values which determined the placement of utility corridors would not be significantly affected by the proposed action.

The proposed action would not follow the over 3,000-foot wide corridor administered by BLM through the 70,000 acres of BLM lands transferred to the Moapa Indian Reservation. The BLM policy is to follow the corridor wherever possible.

The route would also cross the land within the proposed Clark County Wetlands Park in southern Nevada. As the Draft Management Master Plan is scheduled to be released in June or July of 1981, it is not known whether there would be conflicts.

The construction work force for the RMPP would place a significant demand on housing and campgrounds in Kemmerer and Evanston, Wyoming; all communities in Rich and Cache Counties, Utah; Nephi, Utah; Boulder City, Nevada; Bullhead City, Arizona; and Needles, California. This would inconvenience travelers and campers seeking accommodations during construction.

Although the proposed action would cross 4,545 acres of land estimated to contain a high density of cultural resource sites and 1,515 acres of land estimated to contain sites of high significance, compliance procedures would effectively mitigate the potential impacts.

The RMPP would cross potentially active faults in eight locations and would parallel such faults for about 10 miles. At these locations, faulting could conceivably cause a pipeline rupture. Ground liquefaction would pose a hazard to about 19 miles of the route; landsliding to another 17 miles. Areas of significant topographic impact and construction difficulty resulting from sidehill construction total 22 miles. The route would cross three areas of significant slope (greater than 100 percent) parallel to the right-of-way.

Although the proposed action would cross 61 streams, impacts would be insignificant because of the small amount of sediment produced and the short distance that it would be transported downstream.

Construction and operation of the proposed Sage Compressor Station would not significantly change

the existing air quality. Therefore, no impact upon public health and welfare would be expected.

The noise increase expected from operation of the Sage Compressor Station would be below EPA's long-term goal of a day-night average of 55 decibels on the A-weighted scale (dB(A)). Furthermore, any new compressor units would be required to meet all state and Federal regulations in effect at the time of their purchase.

## Alternative A--Northern Systems Alternative

### IMPACT TO RESOURCES

The Northern Systems Alternative would temporarily disturb 931 acres of native vegetation along the best case route and 1,662 acres along the worst-case, similar to that along the proposed action (neither unique nor sensitive). The best case would disturb about 5,399 fewer acres of native vegetation than would the proposed action. The worst case would disturb fewer acres of native vegetation than would the proposed action.

The best case of the alternative would not cross the potential habitat of any Federal or state listed plant species. The worst case of the alternative would cross the potential habitat of two federally listed plant species and two species protected by the State of California, a total of four fewer plants than the proposed action.

As would the proposed action, this alternative would cross various wildlife habitats, all the same types as the proposed action, but would also not cause significant impacts if construction were timed properly. The worst case of the alternative would disturb potential habitat of the endangered black-footed ferret, and an unquantified acreage of San Joaquin kit fox and blunt-nosed leopard lizard habitat in California.

The Northern Systems Alternative would disturb significantly fewer acres of sensitive soils than would the proposed action for the worst case; 1,090 acres compared to 3,056 acres disturbed by the proposed action.

This alternative would create visual resource Class 4 contrast ratings on 15 acres compared to a total of 1,194 acres of visual resource contrasts on the proposed action. Impacts to recreation resources would be of low significance, as compared to the four recreation sites and one ORV race crossed by the proposed action.

The best-case alternative would temporarily disturb half the acres of agricultural lands as would the proposed action and the worst case would temporarily disturb the same acreage as would the proposed action.

The construction work force for the best-case Northern Systems Alternative would place a high demand on housing and campgrounds equal to that of the RMPP in only one small area but in generally different and fewer locations. These locations include all communities in Bear Lake, Caribou, Bannock, and Power Counties, Idaho (Pocatello excepted); Prineville, Oregon; and Colusa, Williams, and Willows, California.

The demand for housing in Kemmerer, Wyoming, and all communities in Rich County, Utah, would be as high as for the proposed action, but would probably be shorter term because the demand would be from pipeline workers rather than compressor station workers. Therefore, inconvenience to travelers and campers during construction of this alternative would be equal to that caused by the proposed action but it would occur for a shorter period.

Constructing the worst case would have the same socioeconomic effects as constructing the best case. The additional 120 miles and 28.3 miles of looping construction required for the worst case would not create any significant socioeconomic impact.

The Northern Systems Alternative best case would cross approximately one- fifth the acres with high density cultural resource sites crossed by the proposed action and no acres of high site significance. The worst case would cross between one-third and one-half the acres of high site density and high site significance crossed by the proposed action.

The worst case facility requirements for the Northern Systems Alternative would avoid the major fault crossings associated with the RMPP, as well as reduce the length of pipeline parallel and adjacent to faults. It would also avoid all of the landslide areas, steep parallel slopes, (over 100 percent), and virtually all of the side slope construction of the proposed route. The best case would encounter significantly fewer geologic hazards than the worst case.

This alternative would cross one-sixth of the streams which would be crossed by the proposed action for the best case and a little over one-half for the worst case.

Although ambient concentrations of nitrogen oxides ($NO_x$) and carbon monoxide (CO) would increase at each of the existing compressor stations along the Northwest, PGT, and PG&E pipeline systems that would be modified for the Northern Systems Alter-

native, the change would not represent a significant impact. Even after modification, none of the compressor stations would exceed the national ambient air quality standards (NAAQS).

All of the modifications would take place in rural areas. Therefore, the incremental increase in noise emissions resulting from the operation of compressor additions would not significantly affect the existing noise environment.

## TOTAL SYSTEM COMPARISON

The Northern Systems Alternative would require significantly less pipeline construction than the RMPP because it would use the existing transmission systems of Northwest, would use the existing PGT and PG&E systems, modified with a prebuilt portion of the Western Leg of the ANGTS, and would exchange up to 240,000 Mcfd of Rocky Mountain gas for Pan Alberta gas.

The assumptions that the Western Leg will be completed south of Stanfield, Oregon, and that it can be prebuilt are essential to the feasibility of the Northern Systems Alternative. This alternative requires that 380 miles of the 630-mile long Western Leg be constructed ahead of the ANGTS schedule. At the present time, construction of the Western Leg between Stanfield and Antioch, California, is anticipated to begin in 1984 or 1985 when construction of the Alaskan portion of the ANGTS begins. If the Western Leg of the ANGTS is never completed, the 380 miles of pipeline looping on PGT's and PG&E's systems would have to be considered as a facility component of the Northern Systems Alternative. If additional pipeline were required south of Brentwood, California, the Northern Systems Alternative would create a project 605.1 miles long--i.e., 76.8 miles of pipeline on Northwest's system, 380 miles on the Western Leg, and 148.3 miles south of Brentwood.

For the 413,000-Mcfd proposal, Northwest would exchange 240,000 Mcfd of RMPP's Rocky Mountain gas for 240,000 Mcfd of PIT's Pan Alberta gas that would otherwise be delivered to Northwest at Stanfield. Northwest would also deliver to Stanfield 90,000 Mcfd of gas from Canada instead of delivering it south to Sage, Wyoming, as proposed. The Northern Systems Alternative would use the Northwest system to transport about 83,000 Mcfd of RMPP gas from the existing Kemmerer Compressor Station northwest to Stanfield, Oregon. Once the RMPP gas volumes exceeded 330,000 Mcfd, 76.8 miles of looping along Northwest's existing system and a new 400-hp. compressor station at Stanfield would be needed to transport the entire 413,000 Mcfd. However, until the RMPP volumes exceed 330,000 Mcfd, no facilities would be required on Northwest's system.

The Pan Alberta gas is presently authorized to be transported to California from Stanfield, Oregon, using new and existing Northwest and El Paso facilities. On June 13, 1980, the FERC approved construction of approximately 350 miles of pipeline paralleling the existing Northwest system. The design of the Northwest system is reversible so that gas from developing Rocky Mountain fields can be transported to the Pacific Northwest and northern California. This design also offers the potential for diversification of the sources of gas supply for the Pacific Northwest, the region most dependent on Canadian supply. At the present time, the Pan Alberta facilities are under construction.

In its November 12, 1980, response to an FERC data request, the RMPC did not state with certainty whether the 120 miles of pipeline between Brentwood and Panoche Junction, California, or the 28.3 miles of pipeline between Hinkley and Adelanto, California, would be required to deliver gas to SoCal and PLS. However, construction of the Brentwood-Panoche Junction pipeline has been considered several times in recent years by pipeline companies and the CPUC. For instance, PIT considered this construction as a portion of an alternative route to deliver the 240,000 Mcfd of Pan Alberta gas to California. PIT alleged that prebuilding portions of the Western Leg to Brentwood might require the phased installation of approximately 96 miles of 36-inch diameter pipeline between Brentwood and Panoche Junction. In addition, PG&E prepared an environmental impact report in 1979 on the construction of additional pipeline facilities in the Brentwood-Panoche Junction corridor in connection with an application filed with the CPUC. This application, filed to allow the CPUC to act quickly if such facilities were needed during a severe shortage of natural gas in southern California, is presently on file as a standby measure; no action is expected on it unless an emergency should appear imminent.

The Brentwood-Panoche Junction and Hinkley-Adelanto facilities could also be required to transport the ANGTS gas to markets in southern California. On the other hand, if the Western LNG Project is completed or deliveries from traditional sources (such as El Paso) remain constant or improve, there might be no need for these facilities. Because of the many variables in forecasting the gas supply for California and which system within California would receive what amount of the RMPP gas, it is not possible at this time to determine whether the facilities would be required for the Northern Systems Alternative. It is in possible to determine at present whether they would be needed later, even

if the RMPP were authorized instead of the Northern Systems Alternative.

At the 413,000-Mcfd level, the 76.8-mile long Northern Systems Alternative would require a minimum of 533.4 fewer miles of pipeline construction than the proposed project, if no additional facilities were required in California. Even with the additional California pipelines, the Northern Systems Alternative would still be 385.1 miles shorter than the RMPP.

The Northern Systems Alternative has the advantage of being able to have all of its facilities constructed adjacent to existing rights-of-way. This would allow phased construction of facilities as gas from the Rocky Mountain region becomes available; all pipeline construction could be delayed indefinitely and built only as needed.

Northwest has not filed an application with the FERC for the facilities that it would need to implement the RMPP. Although the RMPC has indicated that Northwest would require only 0.18 mile of pipe and a meter station for the proposed project, it is not known if additional facilities on Northwest's system would be necessary for the RMPP to transport El Paso's and Northwest's 90,000 Mcfd of 'committed' RMPP gas from Sumas, Washington, to Sage, Wyoming. RMPC has indicated that additional facilities--approximately 63 miles of 24-inch and 19 miles of 36-inch diameter looping and 15,230 hp. of additional compression--might be required on Northwest's system to transport 800,000 Mcfd. Since both the 800,000- and 413,000-Mcfd levels of the RMPP would receive 90,000 Mcfd of gas from Canada and the remaining sources for either level are unknown, these extra facilities might be required for both levels. In that case, the proposed transportation system would be 692 miles long instead of 610 miles.

RMPC's proposal identifies only 2,910 Mcfd as the fuel required to implement the project. However, the RMPC has not identified the incremental fuel which Northwest would require to transport the Canadian gas from Sumas, Washington, to Sage, Wyoming, or more importantly, between Stanfield and Sage. In addition, the applicant has not identified the fuel consumption within California.

If the Western Leg were prebuilt, the Northern Systems Alternative would use about 17,160 Mcfd of fuel gas to deliver 395,840 Mcfd of gas to Antioch, California, at the 413,000-Mcfd level. This fuel use represents a worst-case volume because it does not consider the fuel savings that should occur on the Northwest system as a result of the reduced transportation of other Canadian gas between Stanfield and Sage or the possibility of reduced deliveries from ANGTS or existing Canadian contracts. Fuel use south of Antioch has not been analyzed for the Northern Systems Alternative. According to available information, the alternative would consume 14,250 Mcfd more gas as fuel than the RMPP (490 percent more).

To transport 413,000 Mcfd of RMPP gas plus the ANGTS gas, the Northern Systems Alternative would use 27,780 Mcfd of fuel gas to deliver 385,220 Mcfd of RMPP gas to Antioch--i.e., it would use 24,870 Mcfd more gas for fuel (855 percent more) than the RMPP at the 413,000-Mcfd level.

At the 800,000-Mcfd level, RMPP would use 11,560 Mcfd of gas to deliver 788,440 Mcfd of gas to Needles, California. Assuming that the ANGTS had been completed, the Northern Systems Alternative would use 63,560 Mcfd of gas to deliver 736,440 Mcfd of gas to Antioch. Once again, the facility and fuel considerations on Northwest's system are not known; this analysis presents a worst-case comparison. At these volumes, the Northern Systems Alternative would use 52,000 Mcfd more fuel gas than the RMPP (450 percent more).

To transport 800,000 Mcfd of RMPP gas as well as the Alaskan volumes, the Northern Systems Alternative would have a minimum requirement of 390 miles of new pipeline construction on Northwest's system between the Kemmerer Compressor Station in Lincoln County, Wyoming, and a location north of Caldwell Compressor Station in Baker County, Oregon. However, since both the ANGTS and the Northern Systems Alternative would deliver gas to northern California, there is a much stronger possibility that the facilities south of Antioch would be required and that a total of 538.3 miles of pipeline would be necessary. If only 82 miles of additional pipeline construction were required on Northwest's system to deliver 800,000 Mcfd to the 610-mile long RMPP, there would be a difference of only 153.7 miles of pipeline between the RMPP and the alternative. Consequently, the Northern Systems Alternative would still require fewer miles of pipeline construction than the RMPP, but the fuel use for this alternative would be much greater.

The Northern Systems Alternative engineering analysis provided in appendix E assumes that the Canadian import volumes would remain constant at the 1980 volume and that the ANGTS will transport 640,000-Mcfd through the Western Leg. If either the Alaskan or Canadian volumes were smaller, both the need for additional compression on the Western Leg and the fuel use identified for both the 413,000- and 800,000-Mcfd levels of this alternative would be reduced.

The RMPC has asserted that gas supply for the RMPP would be available from four sources: the Overthrust Belt, other producing areas in the Rocky Mountains, the Hingeline area of central and south-

ern Utah, and other sources including Canadian gas. However, when the RMPC filed its application with the FERC, it had no gas supply under contract; this is still the case nearly 2 years later. Therefore, implementation of the RMPP at this time would require the immediate construction of over 600 miles of entirely new transmission pipeline on the assumption that gas would be available when the system is completed.

On the other hand, the Northern Systems Alternative could transport up to 330,000 Mcfd, 80 percent of the currently proposed but hypothetical volume of gas, before any non-ANGTS facilities were required. The only new facilities which might be needed would be the prebuilt portions of the Western Leg. Should more gas materialize, new facilities could be added as necessary to Northwest's system until the 76.8 miles of pipeline required for the proposed volume were constructed.

This EIS compares the facility requirements for the RMPP and Northern Systems Alternative at the 800,000-Mcfd level. The difference in miles of pipeline required still favors the alternative; however, the alternative would use 5.5 times as much fuel gas per day as the RMPP to accomplish the same purpose.

## Alternative B--Sanpete Valley Alternative

This alternative would disturb a total of 6,215 acres of native vegetation of a similar amount and of similar low significance to that which would be disturbed by the proposed action. It would cross potential habitat of four Federal threatened or endangered or candidate species, compared to the proposed action, which would cross potential habitat of eight species.

The Sanpete Valley Alternative would cross types of wildlife habitats similar to the types which would be crossed by the proposed action, but it would cross twice as much of some types. These include big game range, waterfowl nesting areas, sage grouse habitats, and raptor habitat. Like the proposed action, the alternative would cross an unquantifiable amount of potential endangered black-footed ferret and bald eagle habitat.

The Sanpete Valley Alternative would cross essentially the same amounts of susceptible soil types as would the proposed action. Acres of visual resource contrasts would also be similar in magnitude to those affected by the proposed action, and recreation resources affected would be the same. Temporary disturbance of agricultural lands would total 1,585 acres versus 1,005 acres of disturbance from the proposed action. The alternative would, like the proposed action, permanently remove 5 acres of cropland from production. The alternative would conflict with the same two land use plans and constraints as the proposed action, and have the same potential for possible conflicts with a third draft plan.

The alternative would cross 4,840 acres with a potential for cultural resources of high site significance and 2,420 acres of high site density. This compares to 4,545 acres for the former category and 1,515 acres for the latter category on the proposed action.

This alternative would be subject to less hazard from lava flows and landslides than the RMPP; it would also avoid areas of high slope (over 100 percent) parallel to the route. However, major geologic disadvantages of this alternative include high fault rupture hazard (with little chance for mitigation) and extensive areas subject to liquefaction. In addition, the alternative would create greater topographic impact than the proposed route because it would require 8 miles of sidehill construction, whereas the corresponding portion of the proposed project would require none.

The alternative would cross almost a third more streams than the proposed action--85 crossings compared to 61 crossings. The alternative would create air and noise quality impacts similar to those from the RMPP.

## Alternative C--Central Nevada Alternative

The Central Nevada Alternative would disturb 9,149 acres of native vegetation, almost 2,000 acres more than would be disturbed by the proposed action; again, these impacts would be of low significance. It would cross potential habitat of 12 federally listed plant species and 4 California listed plant species, compared to the potential habitat of 8 federally listed species which would be crossed by the proposed action.

The alternative would cross the same types of wildlife habitat as the proposed action. Acres of big game winter range would be approximately the same; acres of desert bighorn sheep habitat and golden eagle nest areas would be one-half and one-tenth, respectively, of the acres which would be crossed by the proposed action; desert tortoise habitat not on the Federal list would be almost half of that which would be crossed by the proposed action. The alternative would cross approximately

twice as many acres of waterfowl nesting areas, sage grouse habitat, and raptor habitat as the proposed action. The alternative would cross potential habitat of the endangered black- footed ferret north of where it would leave the proposed action, and would have a slight potential of crossing the aquatic habitat of the Railroad Valley springfish, another federally listed species.

The Central Nevada Alternative would disturb 6,217 acres of soils most susceptible to slides and other erosion hazards, compared to 3,056 acres which would be disturbed by the proposed action. As with the proposed action, stabilization would occur on all but a few localized areas within 3 years. The alternative would disturb about the same acreage of Soil Group 1, mountainous soils--1,236 acres, as would the proposed action--1,382 acres, but it would disturb 6,823 acres of Soil Group 9 (soils receiving less than 8 to 10 inches of rainfall annually), compared to 2,811 acres of this soil group disturbed by the proposed action.

The alternative would create visual resource Class 2 contrast ratings on 1,030 acres, Class 3 contrast ratings on 476 acres, and Class 4 ratings on 27 acres as opposed to the proposed action, which would create Class 2 contrast ratings on 606 acres, Class 3 ratings on 573 acres, and Class 4 ratings on 15 acres.

The alternative would affect one managed recreation site, Strawberry Reservoir Recreation Area, compared to the proposed action, which would conflict with an ORV race and users of four managed recreation sites.

The Central Nevada Alternative would directly conflict (pass through) with two BLM Wilderness Study Areas (WSA's). This is the only route analyzed with such conflicts.

It would temporarily disturb slightly more acres of agricultural land than would the proposed action, 1,295 acres compared to 1,065 acres. Like the proposed action, 5 acres of cropland would be permanently removed from production.

The alternative would not follow the utility corridor designated in the BLM California Desert Plan, although it would follow a contingency corridor. It also would not follow the transmission utilities corridor cited in the BLM draft Benton-Owens Valley MFP, and like the proposed action, it would conflict with the Utilities Corridor Rule in the proposed Forest Land Management Plan for the Uinta National Forest. The proposed action would conflict with the same utility corridor rule and would not follow the transmission corridor through the enlarged Moapa Indian Reservation.

The construction work force for the Central Nevada Alternative would place a higher demand on housing and campgrounds than the proposed action. This demand would be greater than the supply in Delta, Utah; all communities in White Pine, Nye, Esmeralda, and Mineral Counties, Nevada; and Mono and Inyo Counties, California. To house the work force, workcamps would be needed, increasing the demand on fire protection. Although the work force would theoretically increase the demand on police and medical services too, the relative increase in population would be less than 4 percent; thus, no deleterious strain on the area would be expected.

The alternative would cross more acres of potentially high density cultural resources sites than would the proposed action--a total of 6,050 acres--but fewer acres of high site significance (1,515 acres) than the proposed action.

With the exception of sharp ridge crossings (slopes over 100 percent) which the alternative would avoid, there are no geologic hazards or topographic constraints which favor this alternative over the proposed action. Major geologic hazards encountered by the alternative would include faulting, ground liquefaction, and landsliding. Volcanic activity within the geologically recent past is also more prevalent along this alternative. The route would require 70 percent more sidehill construction than the proposed route.

The alternative would cross 88 streams instead of the 61 which would be crossed by the proposed action.

The air and noise quality impact resulting from operation of the Sage Compressor Station would be similar to that expected from operation of the RMPP.

## Alternative D--Sevier-Escalante Desert Alternative

This alternative would disturb 6,495 acres of native vegetation, slightly more than that disturbed by the proposed action. It would cross potential habitat of 10 plant species which are federally listed or candidates for listing as threatened or endangered; this is similar to the proposed action, which would cross 8 potential habitats.

The Sevier-Escalante Desert Alternative would cross essentially the same acreages of big game winter range, raptor habitat, and non-federally designated desert tortoise habitat as the proposed action. It would cross fewer than half the acres of desert bighorn sheep areas and more acres of waterfowl nesting areas, sage grouse habitat, and golden eagle nesting areas than the proposed

action. The alternative would cross potential habitat of the endangered black-footed ferret north of where it would leave the proposed action and an unquantifiable amount of bald eagle habitat.

Acres of susceptible soils crossed by the alternative would be similar to those crossed by the proposed action, with slightly higher acreages for dry soils receiving less than 8 to 10 inches of rainfall annually, Soil Group 9.

Acres of visual resource contrasts and managed recreation sites and trails crossed would be essentially the same for the alternative as for the proposed action. Acres of potentially high cultural resource site density crossed by the alternative would be 6,050 acres higher than the proposed action by 1,505 acres. Acres of high cultural resource site significance would be the same as those which would be affected by the proposed action. The alternative would conflict with the same land use plans and constraints as the proposed action.

The alternative would temporarily disturb 1,016 acres of agricultural land versus 1,065 acres disturbed by the proposed action, and like the proposed action, would permanently remove 5 acres of cropland from production.

This alternative would encounter fewer faults than the corresponding segment of the RMPP; therefore the geologic hazards would be substantially fewer. The other hazards would be comparable.

The alternative would cross about the same number of streams as the proposed action. Impacts to air and noise quality would be the same for the alternative as for the proposed action.

## Alternative E--West Salt Lake Alternative

The alternative would disturb 8,071 acres of native vegetation, an increase of 1,741 acres over the acres the proposed action would disturb. Like the proposed action, it would cross potential habitat of eight federally listed or candidate threatened or endangered plant species.

The alternative would cross the same or similar acreages of sage grouse habitat, golden eagle nest areas, and non-federally designated desert tortoise habitat and desert bighorn sheep habitat. It would cross fewer acres of big game winter range, waterfowl nest areas, and raptor habitat than the proposed action. It would cross potential habitat of the endangered black- footed ferret and bald eagle as would the proposed action.

The West Salt Lake Alternative would cross 3,649 acres of susceptible soils compared to 3,056 acres crossed by the proposed action. Of this, 897 acres would be moist salt playa soils which would cause construction difficulties. The alternative would cross over 1,000 fewer acres of Soil Group 1, mountainous soils, than would the proposed action, but almost 2,000 more acres of Soil Group 9--soils receiving less than 8 to 10 inches of precipitation annually.

The alternative would create visual resource Class 2 contrast ratings on 206 acres, Class 3 ratings on 344 acres, and Class 4 contrast ratings on 15 acres, which is less than half that which would be caused by the proposed action. The alternative would cross four managed recreation sites. The alternative would temporarily disturb 1,053 acres of agricultural land compared to 1,065 acres disturbed by the proposed action; each would permanently remove 5 acres of cropland from production.

Conflicts with the Emigration Campground would be moderately significant, as would conflicts with the proposed Frenchman Mountain-Rainbow Gardens National Natural Landmark and proposed Clark County Wetlands Park, which the West Salt Lake Alternative would cross after it rejoined the proposed action. The alternative would also conflict with the same major ORV event as the proposed action. The alternative would avoid the proposed action's conflict with the Utility Corridor Rule of the proposed Forest Land Management Plan for the Uinta National Forest. However, like the proposed action, it would not follow the over 3,000-foot wide corridor administered by BLM through the expanded Moapa Indian Reservation.

The alternative would cross fewer acres with a potential for cultural resource sites of high density and high significance than the proposed action.

The West Salt Lake Alternative would require a greater portion of the local housing supply than required by the portion of the proposed action it would replace; thus, the net effect would be a greater inconvenience to travelers and campers seeking accommodations during construction.

Except for liquefaction potential, the geological hazards along this alternative are less than those of the proposed action segment it would replace. However, the length of alternative pipeline subject to liquefaction would be an order of magnitude higher than that of the proposed route.

The alternative would cross 45 streams instead of the 61 which the proposed action would cross. Air quality and noise quality impacts for this alternative would be similar to those from the RMPP.

## Alternative F--Provo Canyon Alternative

The Provo Canyon Alternative would disturb a similar amount and type of native vegetation as that disturbed by the proposed action, and would cross potential habitat of nine plant species which are federally. listed or candidates for threatened or endangered designation, one more than the proposed action.

The alternative would cross more acres of big game winter range, sage grouse habitat, raptor habitat, and significantly more acres of golden eagle nest areas than the proposed action, 776 acres compared to 242 acres. It would cross the same amount of all other habitats, including desert bighorn sheep areas, waterfowl nest areas, state designated desert tortoise habitat, and potential habitats of the endangered black-footed ferret and bald eagle.

The Provo Canyon Alternative would disturb 2,533 acres of soils which are susceptible to erosion hazards and other limitations, compared to 3,056 acres along the proposed action. The alternative would cause visual resource Class 2 contrast ratings on 897 acres, Class 3 ratings on 381 acres, and Class 4 ratings on 15 acres, a total of 100 acres more than the proposed action which would cause Class 2 contrast ratings on 616 acres, Class 3 ratings on 578 acres and Class 4 ratings on 15 acres.

The alternative would temporarily disturb 1,198 acres of agricultural land compared to 1,065 acres which would be disturbed by the proposed action, and each would permanently remove 5 acres of cropland from production.

The alternative would avoid the conflict with the proposed Uinta National Forest Land Management Plan, but like the proposed action, it would not follow the over 3,000-foot wide corridor administered by BLM through the expanded Moapa Indian Reservation. The alternative would cross slightly more acres of potential high cultural resources density and significance than would the proposed action.

Table 2-11 suggests that the geological hazards and topographical impact for this alternative would be somewhat less than those for the proposed route. However, the crowding of existing facilities within Provo Canyon places serious doubt upon the technical feasibility of this alternative. Further, the side slopes which the alternative would encounter are significantly more severe (60 to 100 percent versus 30 percent) than those along the corresponding segment of the proposed route.

The alternative would cross 53 streams, compared to 61 which the proposed action would cross. Air quality and noise quality impacts which would be created by the alternative would be similar to those which would be created by the RMPP.

## Variation 2--Thistle Creek Variation

The variation would disturb 266 acres of native vegetation, more than the 194 acres which would be disturbed along the segment of the proposed action which it would replace, and it would not cross any potential habitat of Federal or state listed, or candidate plant species, thus avoiding one species. It would cross more acres of big game winter range, raptor habitat, and golden eagle nest areas than would the segment of the proposed action which it would replace, but it would cross fewer areas of sage grouse habitat.

The variation would disturb a few more acres of susceptible soils than the portion of the proposed action which it would replace. It would exceed acceptable levels of visual resource contrast on 121 acres of Class 2 and 158 acres of Class 3, compared to 24 acres of Class 2 contrast rating on the segment of the proposed action. It would temporarily disturb 61 acres of agricultural land compared to none disturbed by the segment of the proposed action.

The variation would cross 326 acres of potentially high cultural resource site density compared to 242 acres which would be crossed by the portion of the proposed action it would replace.

The Thistle Creek Variation would encounter fewer geological hazards and create less topographic impact than the proposed route. Some question remains about the feasibility of locating the pipeline in the canyon with the existing roads and railroad.

The variation would cross seven streams instead of four which the segment of the proposed action would cross. It would cause impacts to air quality and noise quality similar to those caused by the segment of the proposed action it would replace.

## Variation 3--East Las Vegas Variation

The variation would disturb 715 acres of native vegetation, a few more than the corresponding por-

tion of the proposed action and would avoid the habitat of two species of federally listed plants. It would cross 24 acres of desert bighorn sheep habitat and 4 "point" sites compared to 73 acres and 3 "point" sites crossed by the segment of the proposed action.

The East Las Vegas Variation would cross slightly fewer acres of susceptible soils than the proposed action, but more acres of soils receiving less than 8 to 10 inches of rainfall annually. The variation would exceed acceptable levels of visual contrast on 182 acres of Class 2 and 60 acres of Class 3 compared to the segment of the proposed action, which would exceed acceptable contrast levels on 121 acres of land rated as Class 3.

The variation would cross one recreation site; the corresponding segment of the proposed action would cross three.

The East Las Vegas Variation would cross 714 acres of potentially high density cultural resource sites, compared to 678 acres crossed by the proposed action segment which it would replace, and 303 acres of potentially high significance sites compared to none crossed by the proposed action.

The variation would have no significant geological or topographical difference from the proposed route. It would cross two streams instead of the three which would be crossed by the corresponding segment of the proposed action. The variation would cause impacts to air quality and noise quality similar to those which the RMPP would cause.

## Variation 4--Fort Mojave Variation

The Fort Mojave Variation would cross the same amount of native vegetation as the corresponding segment of the proposed action. Neither the variation nor the RMPP segment would encounter federally designated plant species. Both the variation and the segment of the proposed action would cross 121 acres of non-federally designated desert tortoise habitat.

The variation would cross a few more acres of susceptible soils than the segment of the proposed action. Neither the variation nor the segment of the proposed action it would replace would exceed acceptable levels of visual resource contrasts. Neither would affect recreation resource, agricultural lands, or conflict with land use plans. Impacts to cultural resources, air quality, and noise quality would be the same from the variation as from the corresponding segment of the proposed action. The variation would have no significant geological or topographical differences from the proposed route, although it would cross a more deeply dissected alluvial fan. It would cross one stream, as would this segment of the proposed action. This variation would not cross the Fort Mojave Indian Reservation.

## Variation 5--Mill Creek Variation

The Mill Creek Variation would disturb almost 100 more acres of native vegetation than would the segment of the proposed action which it would replace. It would cross the potential habitat of one federally endangered plant species which the corresponding segment of the proposed action would avoid. It would cross over 100 more acres of big game winter range, but it would avoid 400 acres of sage grouse habitat, 376 acres of raptor habitat, and 12 acres of golden eagle nest areas which the corresponding segment of the proposed action would cross.

The variation would cross almost 100 more acres of susceptible mountain soils, but because the topography is less dissected, being for the most part a rounded ridge top, considerably less erosion potential would be present than on the corresponding segment of the proposed action. The variation would exceed acceptable visual resource contrasts for 73 acres in a Class 2 area; the corresponding segment of the proposed action would not create any unacceptable contrasts. No conflicts with recreation resources would occur along the variation or segment of the proposed action it would replace.

The Mill Creek Variation would avoid the conflict between the proposed action and the Utility Corridor Rule of the proposed Forest Land Management Plan for the Uinta National Forest because it would be routed through an area which meets the criteria of the Utility Corridor Rule.

The variation would cross 254 acres of potentially high density cultural resource sites, compared to 157 acres along the proposed action.

The variation would cross one stream, as would the segment of the proposed action which it would replace. Impacts to air quality and noise quality would be the same as those from the corresponding segment of the proposed action.

## Variation 6--Daniels Canyon Variation

The Daniels Canyon Variation would cross slightly fewer acres of native vegetation than would the segment of the proposed action which it would replace. It would cross potential habitat of one federally listed plant species, as would the corresponding segment of the proposed action.

The variation would cross 158 more acres of big game winter range than would this segment of the proposed action, 38 more acres of sage grouse habitat, and fewer acres of waterfowl nesting areas. It would not cross the 48 acres of raptor habitat and 12 acres of golden eagle nest areas which the segment of the proposed action would cross.

The variation would cross 67 more acres of susceptible soils than would the corresponding segment of the proposed action. It would create visual resource Class 2 contrast ratings on 364 acres compared to the corresponding segment of the proposed action which would create Class 2 contrast ratings on 206 acres and Class 3 ratings on 85 acres.

The variation would cause significant impacts to recreational use at Strawberry Reservoir, compared to less significant impacts which would be caused by this segment of the proposed action.

The Daniels Canyon Variation would not be in a designated corridor based on all of the criteria in the Utility Rule in the proposed Forest Land Management Plan for the Uinta National Forest. The corresponding segment of the proposed action would conflict with the Utility Corridor Rule. It would cross 49 more acres of high density cultural resource sites than the proposed action.

The geological hazards and topographical impacts associated with this variation are greater than those associated of the proposed route. The variation would be subject to almost twice as many miles of landsliding and would require more than 10 times the amount of sidehill construction. There is also serious doubt of the technical feasibility of this variation.

The variation would cross 7 streams; the proposed action would cross 11. Impacts to air quality and noise quality would be the same as from the proposed action.

# Chapter 3
# Affected Environment

This EIS analyzes the environment which would be affected by the entire project, including the complete pipeline and related facilities. In addition to the subjects identified in this chapter, the following topics have been analyzed: aquatic biology, transportation networks, floodplains, ground water, and other land uses. The affected environment analyzed for the alternatives includes the pertinent resources along the proposed action plus the resources along each alternative. For example, the affected environment for Alternative B, Sanpete Valley Alternative, includes the entire project area from Sage, Wyoming (MP 0) to south of Needles, California (MP 610); the only portion which differs is the segment from where the alternative would leave the proposed action (MP 176) to where it would rejoin it (MP 356). However, in most cases, in compliance with the Council of Environmental Quality regulations for eliminating duplication, only the portion of the alternative that is different from the proposed action is described, even though the entire project incorporating the alternative is analyzed for total impacts. For the variations, only the portions that differ from the proposed route are described.

Baseline data were collected on each topic for the pipeline right-of-way and surface facility sites (shown on the maps in the *Graphic Supplement*) to a distance where impacts could no longer be identified. For many resources, a mile-wide corridor was analyzed. This area is defined as the affected area. For some resources such as vegetation and soils, the affected area would be confined to the immediate vicinity of construction. For other resources, such as socioeconomics, the affected area would extend beyond the immediate area of construction. To analyze cultural resources which would be affected, a corridor concept was adopted. Existing literature for known cultural resources was reviewed for a 10-mile wide corridor centered on the proposed pipeline right-of-way.

Resources and other environmental categories which would not be greatly affected by implementation of the proposed action or alternatives and variations, or issues which were not raised in the public scoping process are not discussed in detail. The criteria for determining significance of impact is described at the beginning of chapter 4.

Figure 3-1 shows which environmental categories are discussed in this chapter and in chapter 4, which categories would sustain no significant impact, which would sustain impacts similar to those that would occur from the proposed action, and which are unknown. A brief discussion of insignificant impacts is presented at the beginning of chapter 4.

Two environmental categories--cultural resources and water resources--are treated somewhat differently from the rest. These resources are different along each of the alternatives, but the impacts would be the same. Consequently, affected environments are described for each of the alternatives, but environmental consequences in chapter 4 are described only in the proposed action section and apply to all routes.

## PROPOSED ACTION

### Vegetation

The proposed action would traverse 46 miles of forest, 103 miles of sagebrush, 101 miles of mountain brush, 42 miles of pinyon-juniper, 37 miles of saltbush-greasewood, and 193 miles of creosote bush vegetation types. In addition, it would cross 14 acres of riparian vegetation. Estimates of the mileage which would cross riparian vegetation have been based on an average stream crossing width including a 100-foot wide zone of riparian vegetation.

Each vegetation type is described in detail in the *Terrestrial and Aquatic Biology Technical Report* (BLM 1981d). General locations of the vegetation types adopted from Kuchler (1975); appear on map S-24 of the *Graphic Supplement*; mileage is summarized on table 3-1. Lands which would be affected are used largely for agriculture, livestock grazing, wildlife habitat, recreation and watershed, and forest products.

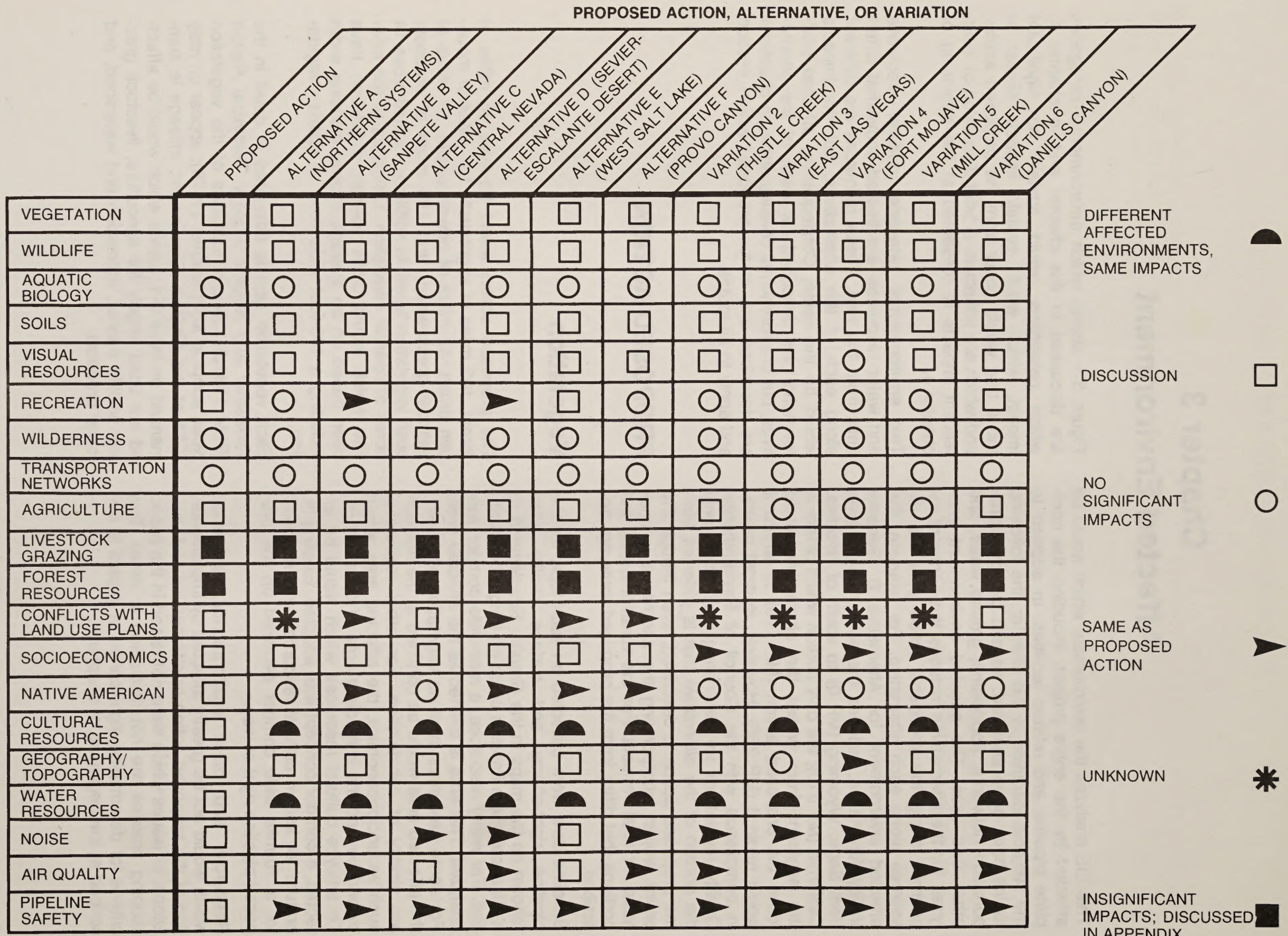



**FIGURE 3-1 KEY TO LEVEL OF RESOURCE DISCUSSION IN CHAPTERS 3 AND 4**

TABLE 3-1

**MILES AND ACRES OF VEGETATION TEMPORARILY DISTURBED BY RMPP AND ALTERNATIVES[a]**

| [a]Vegetation Type | Proposed Action | | Alternative A, Northern Systems | | | | Alternative B, Sanpete Valley | | Alternative C, Central Nevada | | Alternative D, Sevier-Escalante Desert | | Alternative E, West Salt Lake | | Alternative F, Provo Canyon | | Variation 2, Thistle Creek | | Variation 3, East Las Vegas | | Variation 4, Fort Mojave | | Variation 5, Mill Creek | | Variation 6, Daniels Canyon | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Worst | | Best | | | | | | | | | | | | | | | | | | | | | |
| | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres |
| Forest | 46 | 558 | -- | -- | -- | -- | 27 | 327 | 41 | 497 | 32 | 388 | 16 | 194 | 5 | 61 | -- | -- | -- | -- | -- | -- | 2 | 24 | 12 | 145 |
| Mountain Brush | 101 | 1,224 | 10 | 121 | 10 | 121 | 69 | 836 | 94 | 1,139 | 97 | 1,176 | 9 | 97 | 45 | 545 | -- | -- | -- | -- | -- | -- | 13 | 157 | 16 | 194 |
| Sagebrush | 103 | 1,250 | 41 | 498 | 41 | 498 | 45 | 545 | 130 | 1,576 | 50 | 606 | 145 | 1,758 | 133 | 1,611 | 18 | 218 | -- | -- | -- | -- | 2 | 24 | 9 | 109 |
| Pinyon-Juniper | 42 | 510 | -- | -- | -- | -- | 191 | 2,313 | 101 | 1,224 | 71 | 861 | 133 | 1,612 | 87 | 1,055 | 9 | 109 | -- | -- | -- | -- | 4 | 48 | 9 | 109 |
| Saltbush-Greasewood | 37 | 448 | -- | -- | -- | -- | -- | -- | 208 | 2,520 | 86 | 1,042 | 86 | 1,042 | 57 | 691 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Creosote Bush | 193 | 2,341 | 28 | 339 | 26 | 312 | 181 | 2,194 | 181 | 2,194 | 200 | 2,422 | 193 | 2,338 | 193 | 2,338 | -- | -- | 59 | 715 | 10 | 120 | -- | -- | -- | -- |
| Annual Grass | -- | -- | 58 | -- | 704 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Barren Land | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 85 | 1,030 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Riparian Vegetation[b] | -- | 14 | -- | 8 | -- | 2 | -- | 19 | -- | 20 | -- | 14 | -- | 10 | -- | 12 | -- | 2 | -- | .5 | -- | .2 | -- | .2 | | |
| Total Miles | 522 | -- | 137 | 77 | -- | -- | 513 | -- | 755 | -- | 536 | -- | 666 | -- | 520 | -- | 27 | -- | 59 | -- | 10 | -- | 21 | -- | 46 | -- |
| Total Acres | -- | 6,331 | -- | -- | 1,662 | 933 | -- | 6,215 | -- | 9,149 | -- | 6,495 | -- | 8,071 | -- | 6,300 | -- | 266 | -- | 715.5 | -- | 120.2 | -- | 253.2 | -- | 557 |

[a]Acreage based upon 100-foot right-of-way described in chapter 2.

[b]Riparian vegetation was computed at a standard width of 100 feet wide by 100 feet long at each stream crossing listed in the Water Resources Technical Report. Acres per route include all vegetative type, therefore this acreage is not included in the total acreage figures.

Source: Table derived from Kuchler (1975), FS data, BLM unit resource analysis data, SCS Soils Publication, vegetation maps, and personal contact.

### THREATENED AND ENDANGERED SPECIES

The federally listed plants and animals discussed in the vegetation and wildlife sections were identified by the FWS as a result of a section 7(c) of the Endangered Species Act request for a listing of threatened or endangered species that might occur on or near any of the pipeline routes. The *Threatened and Endangered Species Technical Report* (BLM 1981e), was prepared from these lists. This report and a cover letter will constitute the *biological assessment* required by the Endangered Species Act of 1973. Any species found to be in a *may affect* category as a result of the biological assessment will require formal consultation with the FWS before the Notice to Proceed on construction would be issued because there can be no irreversible or irretrievable commitment of resources after the consultation process begins. After receiving the biological assessment, the FWS will issue a biological opinion stating what effect the proposed action would have on the species under consideration and will include, among other items, a presentation of reasonable and prudent mitigation which would avoid jeopardy to the listed species or their critical habitats. The biological assessment is in preparation. The biological opinion is scheduled for completion in time for inclusion in the final EIS.

The federally listed and state recommended threatened and endangered plants listed in appendix H, could occur within the 1-mile wide corridor or could occupy habitat similar to that which would be crossed by the proposed action, Alternative A, (worst case), Alternatives B, C, D, E, and F, and Variations 5 and 6.

### OTHER SIGNIFICANT VEGETATION SPECIES

Other species along the routes are unique to the desert biome and include Joshua trees and cactus species that are not protected under threatened and endangered species legislation, although Federal and state permits authorizing their removal would be required. Populations of these desert plants can be found in numerous locations along the proposed route within the creosote bush and saltbush-greasewood vegetation types from the southern portion of Utah near St. George to Needles, California. These species are desirable for landscaping and collecting, and as a result, Nevada and California require permits for their removal. Refer to map S-24 in the *Graphic Supplement* for the locations and table 3-1 for the acreages of the creosote bush and saltbush-greasewood vegetation types.

There is a population of Rocky Mountain red cedar (*Juniperus scopulorum*) located between MP 162 and MP 165 which would be traversed. This stand is unique because it is located outside of its normal range.

## Wildlife

Several terrestrial communities composed of a more or less distinct mixture of plants and animals would occur in the vicinity of the proposed pipeline route. These are discussed in detail in the *Terrestrial and Aquatic Biology Technical Report* (BLM 1981e).

All terrestrial communities are somewhat influenced by vegetation. Many animals, such as small birds, rodents, weasels, snakes, and frogs, tend to have territories or ranges that are small relative to the area covered by the vegetative type; therefore, they do not usually leave the type. Some creatures, such as beavers, squirrels, and some insects, are restricted to certain vegetation because they are food-specific. On the other hand, some species or groups of species are not restricted but occur over large areas with diverse vegetative types. Some animals adapt to varied conditions and can live in numerous habitats, even though individuals tend to remain in small areas. Deer, elk, larger birds, and larger carnivores have relatively large territories and use a variety of vegetation types in their activities. Large mobile or migratory species are influenced by weather and other factors and tend to move between one or more communities during the year. For instance, deer, elk, and moose move from the higher coniferous forests of their summer range to lower forests, prairies, or agricultural vegetative habitats to winter where the snow cover is not so deep and food is more plentiful. Some avian species, such as ducks, geese, shorebirds, and songbirds, are migratory and remain in communities for only short periods. Table 3-2 lists the preferred vegetative habitats of wildlife species of environmental concern which could be affected by the proposed pipeline project.

TABLE 3-2.

TERRESTRIAL AND AQUATIC SPECIES OF ENVIRONMENTAL CONCERN AND THEIR PREFERRED VEGETATIVE HABITATS [1/]

| Species | State | Vegetative Habitat [1] | | | | | | | | | Route[3] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C | Sa | Mb | Fo | P-J | SG | Cb | AG | BL[2] | |
| Endangered or Threatened: Federal List | | | | | | | | | | | |
| Black-footed Ferret | UT,WY | x | x | | | | x | | | | Proposed Action, all alternatives |
| San Joaquin Kit Fox | CA | x | x | | | | x | | | | Northern Systems |
| Bald Eagle | CA,ID,NV,UT,WY | * | * | * | * | * | * | * | * | * | ALL |
| Yuma Clapper Rail | CA | x | | | | | | | | | Proposed Action |
| Desert Tortoise | UT | | | | | | x | x | | | Proposed Action |
| Blunt-Nosed Leopard Lizard | CA | | | | | | x | x | x | | Northern Systems |
| San Joaquin Kit Fox | CA | | x | x | | | x | | | | Nothern Systems |
| Blunt-Nosed Leopard Lizard | CA | | | | | | x | x | x | | Northern Systems |
| Railroad Valley Springfish | ** | ** | ** | ** | ** | ** | ** | ** | ** | ** | Central Nevada |
| Endangered or Threatened: State List | | | | | | | | | | | |
| Mohave Ground Squirrel | CA | | x | | | | x | x | x | | Northern Systems |
| Desert Tortoise | CA,NV,UT | | | | | | x | x | | | Proposed Action, Central Nevada, Fort Mojave |
| Big Game | | | | | | | | | | | |
| Mule Deer | All states | | x | x | x | x | | | | | All, except Fort Mojave |
| American Elk | ID,UT,WY | | | x | x | | | | | | Proposed Action, Northern Systems, Central Nevada, West Salt Lake, Thistle Creek, Mill Creek, Daniels Canyon |
| Pronghorn | ID,NV,UT,WY | | x | | | | | | | | Proposed Action, Central Nevada, West Salt Lake |
| Moose | ID,UT,WY | | | | x | | | | | | Proposed Action, Northern Systems, West Salt Lake |
| Desert Bighorn Sheep | CA,NV,UT | | | | | | x | x | x | x | Proposed Action, Central Nevada, East Las Vegas |
| Tule Elk | CA | | x | x | x | x | x | | | | Central Nevada |
| Game Birds | | | | | | | | | | | |
| Sage Grouse | WY,ID,UT | | x | | | | | | | | Proposed Action, all alternatives, all variations except West Salt Lake and Fort Mojave |
| Gray Partridge | ID,UT | x | x | | | | | | x | | Northern Systems, West Salt Lake |
| Ring-necked Pheasant | ID,UT | x | | | | | | | | | Proposed Action, all alternatives |
| Other Species of Special Environmental Concern[4] | | | | | | | | | | | |
| Golden Eagle | All states | * | * | * | * | * | * | * | * | * | All |
| White-tailed Prairie Dog | UT,WY | | x | | | | | | x | x | Proposed Action, Northern Systems, West Salt Lake |
| Gila Monster | CA,NV | | | | | | x | x | | x | Proposed Action, Fort Mojave |

[1]This table lists only terrestrial species that may be affected. Aquatic species are not expected to be affected and therefore are not included.

[2]C=Cropland; Sa=Sagebrush;Mb=Mountain brush; Fo=Forest; P-J=Pinyon-Juniper; SG=Sagebrush-Greasewood; Cb=Creosote Bush; AG=Annual Grass; BL=Barren Land.

[3]Includes species covered by the Bald Eagle Act (Golden eagle), species of state concern (gila monster), and the white-tailed prairie dog because it is associated with the black-footed ferret.

*Wide ranging raptors, may occur in all habitats.

**Big Spring near Lockes, Nevada.

Big game species that could occur in the vicinity of the various routes include mule deer (*Odocoileus hemionus*), pronghorn antelope ( *Antilocapra americana*), American elk ( *Cervus elaphus*), moose ( *Alces alces shirasi*), and desert bighorn sheep (*Ovis canadensis nelsoni*). The various vegetative habitats where these species could be encountered are noted in table 3-2. Small game species such as cottontail rabbits (*Sylviagus audubonl*) occur in all states and occupy most vegetative habitats which would be traversed.

Nongame mammals that would be expected to occur in areas which would have project components include insectivores, bats, and rodents. Rodents, especially mice, voles, and gophers, are very common in cultivated areas and grasslands. Shrews tend to live in damp areas along rivers. Most bats hunt and probably rest in or near grasslands or open forest areas. Streams, lakes, and ponds also tend to attract feeding bats.

Abundant upland game birds within the project and alternative areas provide a wide diversity for hunters. Some of the important upland game species that could be encountered along some of the pipeline routes include sage grouse (*Centrocercus urophasianus*), blue grouse (*Dendragapus obscurus*), ring-necked pheasant (*Phasianus colchicus*), Gambel's quail (*Lophortyx gambelii*), chukar (*Alectoris chuka*), gray partridge (*Perdix perdix*), and sharptailed grouse (*Pedioecetes phasianellus*).

Many species of lizards, snakes, frogs, and salamanders could occur along the RMPP. Some of these species also range over several vegetative types because of their food requirements. Species of herpetofauna that should receive special attention include the desert tortoise (which is federally listed in Utah), the blunt-nosed leopard lizard, and a California state listed species, the gila monster. Data on these animals will be found in the *Threatened and Endangered Species Technical Report* (BLM 1981e). In addition, the desert tortoise and blunt-nosed leopard lizard are discussed under 'Federal Threatened and Endangered Species' in chapter 4.

## MAMMALS AFFECTED BY THE PROPOSED ACTION

Large populations of mule deer are found along most sections of the proposed route in Wyoming and Utah. Table 3-3 shows the locations of mule deer ranges. The estimated 157 miles of critical deer winter range habitat along this route consist primarily of sagebrush, mountain brush, and pinyon-juniper vegetative types. In general, deer move onto their winter ranges in mid-November and remain there until mid-April, depending upon the onset of winter and snow depth.

TABLE 3-3. DEER WINTER RANGES ALONG THE VARIOUS PIPELINE ROUTES[1]

| Route | [2]MP | Total Miles |
|---|---|---|
| Proposed Action | | |
| | 0-43 | 43 |
| | 49-52 | 3 |
| | 68-92 | 24 |
| | 152-163 | 11 |
| | 165-170 | 5 |
| | 182-184 | 2 |
| | 188-193 | 5 |
| | 210-224 | 14 |
| | 276-280 | 4 |
| | 288-296 | 8 |
| | 367-379 | 12 |
| | 381-407 | 26 |
| | ..... | 157 |
| Alternative A, Northern Systems Alternative | | |
| Kemmerer Loop | 0-10 | 10 |
| Kemmerer Loop | 15-20 | 5 |
| Pegram Loop | 33-40 | 7 |
| Soda Springs Loop | 66-71 | 5 |
| | ..... | 27 |
| Alternative B, Sanpete Valley Alternative [3] | | |
| Proposed Action | 0-43 | 43 |
| | 49-52 | 3 |
| | 68-92 | 24 |
| | 152-163 | 11 |
| | 165-170 | 5 |
| Sanpete Valley Alternative | 75-154 | 79 |
| Proposed Action | 367-379 | 12 |
| | 381-407 | 26 |
| | ..... | 203 |
| Alternative C, Central Nevada Alternative[4] | | |
| Proposed Action | 0-43 | 43 |
| | 49-52 | 3 |
| | 68-92 | 24 |
| | 152-163 | 11 |
| | 165-170 | 5 |
| | 182-184 | 2 |
| | 188-193 | 5 |
| Central Nevada Alternative | | |
| | 156-158 | 2 |
| | 179-180 | 1 |
| | 205-207 | 2 |
| | 224-230 | 6 |
| | 234-247 | 13 |
| | 428-435 | 7 |
| | 439-446 | 7 |
| | ..... | 131 |
| Alternative D, Sevier-Escalante Desert Alternative[3] | | |
| Proposed Action | 0-43 | 43 |
| | 49-52 | 3 |
| | 68-92 | 24 |
| | 152-163 | 11 |
| | 165-170 | 5 |

TABLE 3-3. DEER WINTER RANGES ALONG THE VARIOUS PIPELINE ROUTES[1]—Continued

| Route | [2]MP | Total Miles |
|---|---|---|
| 182 | -184 | 2 |
| | 188-193 | 5 |
| Sevier-Escalante Desert Alternative | 5-13 | 8 |
| | 19-27 | 8 |
| | 128-139 | 11 |
| Proposed Action | 367-379 | 12 |
| | 381-407 | 26 |
| | ..... | 158 |
| Alternative E, West Salt Lake Alternative[5] | | |
| Kemmerer Loop | 0-10 | 10 |
| Kemmerer Loop | 15-20 | 5 |
| | 33-40 | 7 |
| | 64-70 | 6 |
| | 73-86 | 13 |
| | 96-102 | 6 |
| | 284-307 | 23 |
| Proposed Action | 276-280 | 4 |
| | 288-296 | 8 |
| | 367-379 | 12 |
| | 381-407 | 26 |
| | | 120 |
| Alternative F, Provo Canyon Alternative | | |
| Proposed Action | 0-43 | 43 |
| | 49-52 | 3 |
| | 68-92 | 24 |
| Provo Canyon Alternative | 11-39 | 28 |
| | 87-105 | 28 |
| Proposed Action | 214-224 | 10 |
| | 276-280 | 4 |
| | 288-296 | 8 |
| | 367-379 | 12 |
| | 381-407 | 26 |
| | ..... | 186 |
| Variation 2, Thistle Creek Variation | | |
| | 0-2 | 2 |
| | 9-27 | 18 |
| | | 20 |
| Variation 3, East Las Vegas Variation | | |
| No crucial winter ranges | | |
| Variation 4, Fort Mojave Variation | | |
| No crucial winter ranges | | |
| Variation 5, Mill Creek Variation | | |
| | 0-21 | 21 |
| Variation 6, Daniels Canyon Variation | | |
| | 12-24 | 12 |
| | 47-52 | 5 |
| | | 17 |

[1]Wildlife data were obtainedd from maps furnished by the following state wildlife agencies: California Department of Fish and Game, Idaho Fish and Game Department, Nevada Department of Fish and Game, Utah Division of Wildlife Resources, and Wyoming Game and Fish Department.

[2]Refer to the *Graphic Supplement* to obtain location of various routes and mileposts.

[3]Includes the proposed action above and below where this alternative would leave and rejoin it.

[4]Includes the proposed action above where this alternative would depart.

[5]Includes the proposed action below where this alternative would join.

American elk and possibly moose may also be found along portions of the proposed route. In most cases, their winter ranges coincide with those of mule deer; thus, the impact to these animals would be similar. Elk and moose generally tend to winter at slightly higher elevations than mule deer, even though they might winter in the same general area.

Desert bighorn sheep populations could be encountered along the Nevada portions of this route from about the Mormon Mountains south to the Newberry Mountains. In most cases, the pipeline route would not actually intersect the sheep ranges but would go within a few miles of that habitat. (Refer to table 3-4 for the locations of bighorn sheep habitat.) However, the route would cross sheep ranges in the Sunrise Mountain-Frenchman Mountain-Lava Butte area south of Las Vegas. Sheep migration paths would cross the pipeline route in the Muddy Mountains-Dry Lake Range area, McCullough Range-River Mountain area, and the Eldorado Mountains-Highland Range area.

Feral horses and burros would be found scattered in four areas along the proposed route: just west of Kanosh, Utah; south along White Sage Flats to west of Dog Valley in the vicinity of the East Mormon Mountains in Nevada; in the Dry Lake Range northwest of Las Vegas; and along Highway 95 south of Henderson, Nevada, a distance of about 10 miles.

TABLE 3-4

DESERT BIGHORN SHEEP YEAR-ROUND RANGES NEAR THE VARIOUS PIPELINE ROUTES[1]

| Route | MP[2] | Total Miles |
|---|---|---|
| Proposed Action | 435-445 | 10 |
| | 463-464 | 1 |
| | 485-486 | 1 |
| | 494-495 | 1 |
| | 509-515 | 6 |
| | 537-538 | 1 |
| | 548-549 | 1 |
| | 556-570 | 4 |
| | ..... | 25 |
| Alternative B, Sanpete Valley | | |
| Sanpete Valley Alternative | | none |
| Proposed Action | | |
| | 435-445 | 10 |
| | 436-464 | 1 |
| | 485-486 | 1 |
| | 494-495 | 1 |
| | 509-515 | 6 |
| | 537-538 | 1 |
| | 548-549 | 1 |
| | 556-570 | 4 |
| | ..... | 25 |
| Alternative C, Central Nevada Alternative | | |
| Proposed Action | | |
| Central Nevada Alternative | 385-390 | 5 |
| | 395-397 | 2 |
| | ..... | 7 |
| Alternative D, Sevier-Escalante Desert Alternative | | |
| Sevier-Escalante Desert Alternative | | none |
| Proposed Action | 435-445 | 10 |
| | 463-464 | 1 |
| | 485-486 | 1 |
| | 494-495 | 1 |
| | 509-515 | 6 |

TABLE 3-4—Continued

| Route | MP[2] | Total Miles |
|---|---|---|
| 537 | -538 | 1 |
| | 548-549 | 1 |
| | 556-570 | 4 |
| | ..... | 25 |
| Alternative E, West Salt Lake Alternative | | |
| West Salt Lake Alternative | | none |
| Proposed Action | 435-445 | 10 |
| | 463-464 | 1 |
| | 485-486 | 1 |
| | 494-495 | 1 |
| | 509-515 | 6 |
| | 537-538 | 1 |
| | 548-549 | 1 |
| | 556-570 | 4 |
| | ..... | 25 |
| Alternative F, Provo Canyon Alternative | | |
| Provo Canyon Alternative | | none |
| Proposed Action | 435-445 | 10 |
| | 463-464 | 1 |
| | 485-486 | 1 |
| | 494-495 | 1 |
| | 509-515 | 6 |
| | 537-538 | 1 |
| | 548-549 | 1 |
| | 556-570 | 4 |
| | ..... | 25 |
| Variation 3, East Las Vegas Variation | | |
| East Las Vegas Variation | | |
| | 14-15 | 1 |
| | 28-30 | 2 |
| | 32-33 | 1 |
| | 53-54 | 1 |
| | ..... | 5 |
| The East Las Vegas Variation has four "point" sites and 2 miles of range close to the route. | | |

[1]Wildlife data were obtained from maps furnished by the following state wildlife agencies: California Department of Fish and Game, Idaho Fish and Game Department, Nevada Department of Fish and Game, Utah Division of Wildlife Resources, and Wyoming Game and Fish Department.

[2]Refer to the *Graphic Supplement* to obtain locations of various routes and mileposts.

Small mammals (rodents, bats, shrews, etc) would be found throughout the entire length of this route, occurring in large numbers in all vegetation habitats. The only small mammal species of environmental concern along this route would be the endangered Utah prairie dog which is discussed in 'Federal Threatened and Endangered Species,' and the white-tailed prairie dog, which could furnish food and burrow habitat for the endangered black-footed ferret. Even though the white-tailed prairie dog is not federally listed, it is discussed in conjunction with the black-footed ferret because these two species are so closely interrelated.

## BIRDS AFFECTED BY THE PROPOSED ACTION

Sagebrush habitat, occupied by sage grouse, would be traversed by the proposed route for an estimated total of 33 miles. (A 100-foot right-of-way 33 miles long equals 400 acres.) (Refer to table 3-5 for locations of sage grouse habitat.) Most of the sage grouse habitats in Utah are located north of a line running east and west through Beaver, Utah, with the largest populations occurring in the northern half of the state.

Ring-necked pheasant distribution along this route concides with croplands and irrigated areas.

TABLE 3-5.

SAGE GROUSE HABITAT ALONG THE VARIOUS PIPELINE ROUTES[1]

| Route | [2]MP | Total Miles |
|---|---|---|
| Proposed Action | 5-9 | 4 |
| | 22-26 | 4 |
| | 30-41 | 11 |
| | 49-52 | 3 |
| | 134-139 | 5 |
| | 173-176 | 3 |
| | 281-284 | 3 |
| | ..... | 33 |
| Alternative A, Northern Systems Alternative | | |
| Kemmerer Loop | 0-8 | 8 |
| Kemmerer Loop | 15-19 | 4 |
| Kemmerer Loop | 34-39 | 5 |
| | ..... | 17 |
| Alternative B, Sanpete Valley Alternative[3] | | |
| Proposed Action | 5-9 | 4 |
| | 22-26 | 4 |
| | 30-41 | 11 |
| | 49-52 | 3 |
| | 134-139 | 5 |
| | 173-176 | 3 |
| Sanpete Valley Alternative | 0-18 | 18 |
| | 135-139 | 4 |
| | 144-148 | 4 |
| Proposed Action | 281-284 | 3 |
| | ..... | 59 |
| Alternative C, Central Nevada Alternative[4] | | |
| Proposed Action | 5-9 | 4 |
| | 22-26 | 4 |
| | 30-41 | 11 |
| | 49-52 | 3 |
| | 134-139 | 5 |
| | 173-176 | 3 |
| Central Nevada Alternative | 145-150 | 5 |
| | 165-169 | 9 |
| | 187-196 | 7 |
| | 200-207 | 7 |
| | 240-248 | 8 |
| | | 66 |
| Alternative D, Sevier-Escalante Desert Alternative[5] | | |
| Proposed Action | 5-9 | 4 |
| | 22-26 | 4 |
| | 30-41 | 11 |
| | 49-52 | 3 |
| | 134-139 | 5 |
| | 173-176 | 3 |
| Sevier-Escalante Desert Alternative | 11-19 | 8 |
| Proposed Action | 281-284 | 3 |
| | | 41 |
| Alternative E, West Salt Lake Alternative[3] | | |
| West Salt Lake Alternative | 0-8 | 8 |

TABLE 3-5.—Continued

| Route | [2]MP | Total Miles |
|---|---|---|
| 15 | -18 | 3 |
| | 120-128 | 8 |
| | 142-161 | 19 |
| | 292-297 | 5 |
| Proposed Action | 281-284 | 3 |
| | | 46 |
| Alternative F, Provo Canyon Alternative | | |
| Proposed Action | 5-9 | 4 |
| | 22-26 | 4 |
| | 30-41 | 11 |
| | 49-52 | 3 |
| | 281-284 | 3 |
| | ..... | 25 |
| Provo Canyon | None Known | |
| Variation 2, Thistle Creek Variation | | |
| No sage grouse areas known | | ..... |
| Variation 5, Mill Creek | | |
| No sage grouse areas known | | ..... |
| Variation 6, Daniels Canyon Variation | | |
| | 30-38 | 8 |

[1]Wildlife data were obtained from maps furnished by the following state wildlife agencies: California Department of Fish and Game, Idaho Fish and Game Department, Nevada Department of Fish and Game, Utah Division of Wildlife Resources, and Wyoming Game and Fish Department.

[2]Refer to the *Graphic Supplement* to obtain various locations of routes and mileposts.

[3]Includes the proposed action above and below where this alternative would leave and rejoin it.

[4]Includes the proposed action above where this alternative would depart.

[5]Includes the proposed action below where this alternative would join.

The small Gambel's quail would be found near the southern portions of this route in Utah from about the Bull Valley Mountains to the Utah/Nevada state line. They are also found along the east side of the Mormon Mountains, near the Desert Queen Well area, north and east of Searchlight, and in an area about 25 miles south of Searchlight. All of these populations are located in intensively managed quail areas which are principally managed using gallinaceous guzzlers (artificial water sources). These quail populations are extremely dependent upon artificial water sources for survival during the late nesting period and through the hot summer months.

Various species of waterfowl could be found along some of the wet, marshy, or riverine areas and reservoirs in areas which would be traversed by the pipeline. There would be an estimated 34 miles of waterfowl habitat along this route in Utah. (See table 3-6 for these locations.) This small amount of habitat and the resulting low nesting population of ducks and geese are functions of the dry areas that would be traversed by the pipeline rather than indications of total waterfowl habitat in the entire state of Utah. Nesting of some waterfowl species begins in early April and can continue into early June in the northern parts of the state which would be traversed by the pipeline. Good waterfowl habitat could be found along this route along the Bear River from Sage Creek Junction to about Woodruff (MP 5 to MP 26). The areas around Neponset Reservoir (MP 36 to MP 39) and Strawberry Reservoir (MP 130 to MP 140) also furnish good waterfowl habitat.

TABLE 3-6

WATERFOWL AREAS ALONG THE VARIOUS PIPELINE ROUTES[1]

| Route | [2]MP | Total Miles |
|---|---|---|
| Proposed Action | 5-26 | 21 |
| | 36-39 | 3 |
| | 130-140 | 10 |
| | | 34 |
| Alternative A, Northern Systems Alternative | | |
| Best Case | 18-24 | 6 |
| | 73-83 | 10 |
| | 142-167 | 25 |
| | ..... | 41 |
| Worst Case | 0-16 | 16 |
| Alternative B, Sanpete Valley Alternative | | |
| Proposed Action | 5-26 | 21 |
| | 36-39 | 3 |
| | 130-140 | 10 |
| Sanpete Valley Alternative | 39-44 | 5 |
| | 59-74 | 15 |
| | 88-96 | 8 |
| | 103-110 | 7 |
| | 125-131 | 6 |
| | | 75 |
| Alternative C, Central Nevada Alternative | | |
| Proposed Action | 5-26 | 21 |
| | 36-39 | 3 |
| | 130-140 | 25 |
| Central Nevada Alternative | 485-487 | 2 |
| | 525-542 | 17 |
| | 565-569 | 4 |
| | | 72 |
| Alternative D, Sevier-Escalante Desert Alternative* | | |
| Proposed Action | 5-26 | 21 |
| | 36-39 | 3 |
| | 130-140 | 25 |
| Sevier-Escalante Desert Alternative | 45-47 | 2 |
| | | 51 |
| Alternative E, West Salt Lake Alternative | 18-24 | 6 |
| Alternative F, Provo Canyon Alternative | | |
| Proposed Action | 5-26 | 21 |
| | 36-39 | 3 |
| Provo Canyon Alternative | None Known | |
| | | 24 |
| Variation 5, Mill Creek Variation | 3-7 | 4 |
| | 10-13 | 3 |
| | | 7 |

TABLE 3-6—Continued

| Route | [2]MP | Total Miles |
|---|---|---|
| Variation 6, Daniels Canyon Variation | 27-36 | 9 |

*Includes proposed action above and below where this alternative would leave and rejoin the proposed action.

[1]Wildlife data were obtained from maps furnished by the following state wildlife agencies: California Department of Fish and Game, Idaho Fish and Game Department, Nevada Department of Fish and Game, Utah Division of Wildlife Resources, and Wyoming Game and Fish Department.

[2]Refer to the *Graphic Supplement* to obtain various locations of routes and mileposts.

There would be an abundance of raptor habitat and a wide variety of raptorial birds along an estimated 51 miles of the proposed route in both Utah and Nevada. (Refer to table 3-7 for these locations.) The northern portion of the route from Sage, Wyoming, through Strawberry Valley furnishes nesting habitat for Swainson's hawks, great horned owls, prairie falcons, and red-tailed hawks; all of these species have been reported as nesting in this area. The Strawberry Valley is a wintering area for many raptors, and during the summer, the area south of the Uinta National Forest from Strawberry Valley to Sheep Creek furnishes nesting habitat for Cooper's, red-tailed, sharp-shinned, and rough-legged hawks and goshawks. The Little Clear Creek area is a well-known nesting area for ferruginous hawks.

The Mineral Mountain area, Antelope Range, and the Beaver Dam Mountains all furnish good raptor habitat. Habitat for cliff-nesting raptors such as great horned owls, prairie falcons, and golden eagles (as listed in table 3- 8) would be found in all cliff areas along the route, but especially in the area southeast of Las Vegas near the River Mountains where good nesting cliffs would be located 1 to 2 miles from the proposed route. Nesting periods generally occur between March 1 and July 1.

TABLE 3-7

RAPTOR HABITAT LOCATED WITHIN 2.5 MILES OF THE VARIOUS PIPELINES[1]

| Route | [2]MP | Total Miles |
|---|---|---|
| Proposed Action | 18 | 1 |
| | 27-29 | 2 |
| | 40 | 1 |
| | 129-158 | 29 |
| | 165-169 | 4 |
| | 290-294 | 4 |
| | 356-358 | 2 |
| | 404-407 | 3 |
| | 510-515 | 5 |
| | | 51 |
| Alternative A, Northern Systems Alternative Best Case | 33-40 | 7 |
| | 66-88 | 22 |
| | 142-167 | 25 |
| | | 54 |

TABLE 3-7—Continued

| Route | [2]MP | Total Miles |
|---|---|---|
| Worst Case | 0-120 | 120 |
| Alternative B, Sanpete Valley Alternative | | |
| Proposed Action | 18 | 1 |
| | 27-29 | 2 |
| | 40 | 1 |
| | 129-158 | 29 |
| | 165-169 | 4 |
| Sanpete Valley Alternative | 5-11 | 6 |
| | 40-45 | 5 |
| | 94-105 | 11 |
| | 113-118 | 5 |
| | 130-155 | 25 |
| | 183-186 | 3 |
| Proposed Action | 356-358 | 2 |
| | 404-407 | 3 |
| | 510-515 | 5 |
| | | 102 |
| Alternative C, Central Nevada Alternative[4] | | |
| Proposed Action | 17-18 | 1 |
| | 27-29 | 2 |
| | 39-40 | 1 |
| | 129-158 | 29 |
| | 150-154 | 4 |
| Central Nevada Alternative | 152-154 | 2 |
| | 157-196 | 39 |
| | 202-204 | 2 |
| | 235-238 | 3 |
| | 310-313 | 3 |
| | 329-331 | 3 |
| | 334-341 | 7 |
| | | 96 |
| Alternative D, Sevier-Escalante Alternative[3] | | |
| Proposed Action | 17-18 | 1 |
| | 27-29 | 2 |
| | 39-40 | 1 |
| | 129-158 | 29 |
| | 165-169 | 4 |
| Sevier-Escalante Desert Alternative | 82-83 | 1 |
| | 92-93 | 1 |
| | 127-128 | 1 |
| | 134-135 | 1 |
| Proposed Action | 404-407 | 3 |
| | 510-515 | 5 |
| | | 49 |
| Alternative E, West Salt Lake Alternative[5] | | |
| Proposed Action | 150-161 | 11 |
| | 107-180 | 3 |
| | 63-64 | 1 |
| | 290-294 | 4 |
| | 356-258 | 2 |
| | 404-407 | 3 |
| | 510-515 | 5 |
| | ..... | 29 |
| Alternative F, Provo Canyon Alternative | | |
| Proposed Action | 18 | 1 |
| | 27-29 | 2 |
| | 40 | 1 |
| Provo Canyon Alternative | 3-11 | 8 |
| | 21-39 | 18 |
| | 89-100 | 11 |
| | 105-113 | 8 |
| Proposed Action | 290-294 | 4 |

TABLE 3-7—Continued

| Route | [2]MP | Total Miles |
|---|---|---|
| | 356-358 | 2 |
| | 404-407 | 3 |
| | 510-515 | 5 |
| | ..... | 63 |
| Variation 2, Thistle Creek Variation | 8-27 | 19 |

[1]Wildlife data were obtained from maps furnished by the following state wildlife agencies: California Department of Fish and Game, Idaho Fish and Game Department, Nevada Department of Fish and Game, Utah Division of Wildlife Resources, and Wyoming Game and Fish Department.

[2]Refer to the *Graphic Supplement* to obtain locations of various routes and mileposts.

[3]Includes the proposed action above and below where this alternative would leave and rejoin it.

[4]Includes the proposed action above where this alternative would depart.

[5]Includes the proposed action below where this alternative would join.

TABLE 3-8

GOLDEN EAGLE NESTING AREAS ALONG THE VARIOUS PIPELINE ROUTES[1]

| Route | [2]MP | Total Miles |
|---|---|---|
| Proposed Action | 29 | 1 |
| | 165 | 1 |
| | 307 | 1 |
| | 313 | 1 |
| | 477-488 | 11 |
| | 510-515 | 5 |
| | | 20 |
| Alternative B, Sanpete Valley Alternative | | |
| Proposed Action | 29 | 1 |
| | 165 | 1 |
| Sanpete Valley Alternative | 5-11 | 6 |
| | 40-45 | 5 |
| | 94-105 | 11 |
| | 113-118 | 5 |
| | 130-155 | 25 |
| | 183-186 | 3 |
| Proposed Action | 356-358 | 2 |
| | 404-407 | 3 |
| | 510-515 | 5 |
| | | 67 |
| Alternative D, Sevier-Escalante Desert Alternative[3] | | |
| Proposed Action | 28-29 | 1 |
| | 164-165 | 1 |
| Sevier-Escalante Desert Alternative | 66-67 | 1 |
| | 82-83 | 1 |
| | 92-93 | 1 |
| | 127-128 | 1 |
| | 134-135 | 1 |
| Proposed Action | 477-488 | 11 |
| | 510-515 | 5 |
| | | 23 |
| Alternative F, Provo Canyon Alternative | | |
| Proposed Action | 29 | 1 |
| Provo Canyon Alternative | 3-11 | 8 |
| | 21-39 | 18 |
| | 89-100 | 11 |

TABLE 3-8—Continued

| Route | [2]MP | Total Miles |
|---|---|---|
| Proposed Action | 105-113 | 8 |
| | 307 | 1 |
| | 313 | 1 |
| | 477-488 | 11 |
| | 510-515 | 5 |
| | | 64 |
| Variation 2, Thistle Creek Variation | 8-27 | 19 |

[1]Wildlife data were obtained from maps furnished by the following state wildlife agencies: California Department of Fish and Game, Idaho Fish and Game Department, Nevada Department of Fish and Game, Utah Division of Wildlife Resources, and Wyoming Game and Fish Department.

[2]Refer to the *Graphic Supplement* to obtain locations of various routes and mileposts.

[3]Includes the proposed action above and below where this alternative would leave and rejoin it.

## FEDERAL AND STATE LISTED SPECIES

Several federally listed species occur along the proposed route, including the black-footed ferret (endangered), the bald eagle (endangered), and the desert tortoise (threatened only in Utah). The black-footed ferret could be found along portions of the proposed route in Wyoming and Utah wherever the route would encounter white-tailed prairie dog colonies. Field surveys will be required to determine whether the route would cross prairie dog colonies; if it were, surveys for ferrets would have to be initiated. The proposed route would cross about 37 miles of bald eagle habitat. The desert tortoise is federally listed as threatened only in the Beaver Dam Slope area of southwestern Utah. The present alignment of the proposed route would not cross the designated critical habitat os this species although it would pass within several miles.

The desert tortoise is listed as rare by the states of Nevada and Utah, and has protected status in California. It is located along the proposed route from about MP 441 to MP 580 in these three states.

The Utah prairie dog which is also federally listed as an endangered species may occur near portions of this route in south-central Utah.

## Soils

The project area includes a complex combination of soils due to the wide variation of geologic, topographic, climatic, and vegetation features. This complexity creates a wide variety but a repetitive distribution of soils. Physical and chemical soil properties would react in various ways to project

construction. Soils are discussed in more detail in the *Soils and Agriculture Technical Report* (BLM 1981).

Due to the complex combination and wide variety of soils that would be encountered in the project area, this analysis combines general soil associations into generalized groupings to identify the soils most susceptible to impact. The general soil associations considered most susceptible to impacts, requiring more intensive erosion control, revegetation, and restoration measures, are grouped as follows:

**SOIL GROUP 1**

Shallow to deep, moderately steep, and steep soils of the mountains (including narrow valleys, floodplains and smoother side slopes, and alluvial fans) receiving an average annual precipitation of 14 to 28 inches. Soils and topography of this soil group are extremely variable within short distances. They include soils with 15- to 50-percent coarse fragments. Areas of Soil Group 1 are identified on the base maps in the *Graphic Supplement*.

**SOIL GROUP 2**

Shallow to deep, moderately steep, and steep, stony soils of the mountains and plateaus that are usually dry; average annual precipitation ranges from 8 to 14 inches. Included are soils on smoother side slopes and alluvial fans. Soils and topography of this soil group are extremely variable within short distances.

**SOIL GROUP 3**

Strongly alkaline and saline, poorly to well-drained soils on floodplains, lake basins, and valley plains.

**SOIL GROUP 4**

Predominantly sandy and loamy sand soils on undulating to rolling convex slopes in broad upland benches.

**SOIL GROUP 5**

Soils with duripans, hardpans, and shallow soils over bedrock on dissected fans, pediments, and foothills.

**SOIL GROUP 6**

Soils on moderately steep to steep side slopes and ridges, including strongly sloping areas with 9- to 30-percent slopes (not including mountain areas).

**SOIL GROUP 7**

Playas (land type).

**SOIL GROUP 8**

Rockland and barren land (land types).

**SOIL GROUP 9**

Soils receiving an annual precipitation generally less than 8 to 10 inches. This soil group also includes some areas receiving annual precipitation of 10 to 14 inches related to elevation variations (principally in the west-central Nevada area).

Estimated acreages and mileages of these soil groupings for the proposed action, alternatives, and variations are listed in table 3-9. Approximate occurrences and extent of these generalized soil associations are presented in the *Soils and Agriculture Technical Report* (BLM 1981c).

All soils would be temporarily affected by project construction and operation, but the nine identified soil groups provide a basis for determining areas of potential impacts.

TABLE 3-9

GROUPING OF GENERAL SOIL ASSOCIATION MOST SUSCEPTIBLE TO EFFECTS OF PROJECT ACTIVITIES

| Description of General Soil Association Groups | Proposed Action | Alternative A, Northern Systems | | Alternative B, Sanpete Valley | Alternative C, Central Nevada | Alternative D, Sevier-Escalante Desert | Alternative E, West Salt Lake | Alternative F, Provo Canyon | Variation 2, Thistle Creek | Variation 3, East Las Vegas | Variation 4, Fort Mojave | Variation 5, Mill Creek | Variation 6, Daniels Canyon | Comments-Limitations to Pipeline Construction and Right-of-Way Restoration and Revegetation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Miles, *Acres | | | | | | | | | | | | |
| | Miles, *Acres | Worst Case | Best Case | Miles, *Acres | Miles, *Acres | Miles, *Acres | Miles, *Acres | Miles, *Acres | Miles, *Acres | Miles, *Acres | Miles, *Acres | Miles, *Acres | Miles, *Acres | |
| Soil Group 1 | | | | | | | | | | | | | | |
| Shallow to deep, moderately steep and steep soils of the mountains that are usually moist part of the summer (14-28 inches precipitation) Including narrow valleys, flood plains and less sloping areas) | 114<br>*1,382 | 3<br>*36 | 3<br>*36 | 114<br>*1,383 | 102<br>*1,236 | 108<br>*1,309 | 31<br>*376 | 61<br>*739 | [a]19<br>*230<br>(17)<br>(*206) | | | [b]21<br>(13)<br>*255<br>(*158) | [c]46<br>(43)<br>*558<br>(*521) | Contains specific areas of poor slope stability, high erosion hazards on areas of steep slopes. Some areas of hard bedrock. |
| Soil Group 2<br>Shallow to deep, moderately steep to very steep, stony soils of the mountains that are usually dry. (8-14 inches precipitation) | 14<br>*170 | | | 21<br>*255 | 74<br>*897 | 19<br>*230 | 23<br>*279 | 24<br>*291 | | | 2<br>*24<br>(0) | | | Stony areas, hard bedrock, difficult restoration of vegetation, and difficult construction. |
| Soil Group 3<br>Dominantly strong alkaline and saline, poorly to well drained soils of the flood plains, lake basins and valley plains | 36<br>*436 | | | 34<br>*412 | 162<br>*1,963 | 60 | *727 | 73<br>*885 | 35<br>*424 | | | | | Wind erosion hazard, restoration very difficult requiring special construction techniques. |
| Soil Group 4<br>Dominantly sandy soils on undulating ridges and terraces. | 5<br>*61 | 26<br>*315 | | 5<br>*61 | 66<br>*800 | 5<br>*61 | 4<br>*48 | 5<br>*61 | | | 1<br>*12<br>(5)<br>(*61) | | | High wind erosion hazard, restoration and erosion control very difficult. |
| Soil Group 5<br>Soils with duripans and soils shallow over bedrock on dissected fans, foothills and sediments. | 47<br>*570 | 10<br>*121 | 7<br>*85 | 47<br>*570 | 40<br>*485 | 47<br>*570 | 47<br>*570 | 47<br>*570 | | 17<br>*206<br>(15)<br>(*182) | | | | Restoration, and erosion control difficult. |
| Soil Group 6<br>Soils on slopes of 15-25% (not including mountain areas). | 17<br>*206 | 49<br>*594 | 13<br>*158 | 17<br>*206 | 38<br>*461 | 17<br>*206 | 35<br>*424 | 16<br>*194 | | 0<br>*0<br>(6)<br>(*73) | 9<br>*109<br>(6)<br>(*73) | | | Erosion Control |
| Soil Group 7<br>Playas (land type) | 5<br>*61 | | | | 8<br>*97 | 3<br>*36 | 74<br>*897 | 4<br>*48 | | | | | | Difficult construction. |
| Soil Group 8<br>Dominantly rockland and barren land (land type) | 14<br>*170 | 2<br>*24 | | 14<br>*170 | 18<br>*218 | 14<br>*170 | 14<br>*170 | 17<br>*206 | | | 2<br>*24<br>(0)<br>(*0) | | | Erosion hazard on barren areas and difficult construction. |
| Total of Soil Groups 1 through 8 | 252<br>*3,056 | 90<br>*1,090 | 23<br>*279 | 252<br>*3,056 | 508<br>*6,157 | 273<br>*3,309 | 301<br>*3,649 | 209<br>*2,533 | 19<br>*230<br>(17)<br>(*206) | 17<br>*206<br>(21)<br>(*255) | 14<br>*169<br>(11)<br>(*134) | 21<br>*255<br>(13)<br>(*158) | 46<br>*588<br>(43)<br>(*521) | |
| Soil Group 9[a]<br>Soils in climatic settings generally with annual precipitation less than 8 to 10 inches. | 232<br>*2,811 | 41<br>*497 | 12<br>*145 | 243<br>*2,945 | 578<br>*7,005 | 280<br>*3,394 | 391<br>4,739 | 232<br>*2,811 | | 59<br>*715<br>(55)<br>(*667) | 10<br>*121<br>(0)<br>(*0) | | | Restoration of native vegetative areas. Reseeding usually not as successful. Erosion hazard. |

NOTES: These are general groups of soils containing more occurrences of specific areas with soil properties more susceptible to effects resulting from project activities. Mileage totals are estimates tabulated from General Soil Association Display Maps on scale of 1:250,000 and from appendix B in Soil and Agricultural Technical Report. Acreage totals based on 100-foot wide right-of-way. These soils require more intensive implementation or erosion control and restoration procedures to minimize soil erosion and potential impacts,

NOTE: ( ) indicates miles of soil group replaced by alternative or variation.

[a]Consists of 19 miles of narrow mountain valley bottom with steep mountain slopes that is included in mapping.

[b]Differs from the area replaced in proposed action by traversing 6 miles of a very narrow mountain valley.

[c]Differs from the area replaced in proposed action in that it follows a very narrow canyon.

[d]Soil Group 9 is based on climatic setting and includes Soil Groups 3, 4, 5, 6, 7, and 8 where they occur in this setting.

# Visual Resources

Visual resources are the physical characteristics of a landscape coupled with the viewing public's perception of these characteristics and its response to observable change within the landscape. These characteristics are frequently described in design terms according to the form, line, color, and texture of the natural features found in the specific landscape being scrutinized. Change in the landscape is perceived by the viewer when the land or water form or vegetation is modified and/or structures are added to that landscape. These concepts and the analysis process are discussed in detail in the *Visual Resource Technical Report* (BLM 1981g).

## METHODOLOGY

The diverse landscapes upon which the proposed action, alternatives, and variations would be overlain are classified into a number of physiographic provinces (Fenneman 1931). These provinces serve as a basis for grouping the various routes into homogeneous segments to assess visually perceived changes to the landscape which would occur as a result of the project. For purposes of analyzing these changes, the BLM Visual Resource Management (VRM) system and the FS Visual Management System (VMS) were used as analytical tools (BLM 1978b, FS 1974). See appendix I for a description of the methodologies.

The result of the analysis is a classification of either a BLM VRM Class or FS Visual Quality Objective (VQO) being assigned to segments by milepost along each route. Three considerations were made in each case: (1) the scenic quality or visual variety of the landscape, (2) the visual sensitivity of the area, based upon volumes of users within the area and how they would accept visually perceivable changes within the particular landscape, and (3) the distance between the viewer and the change which would be created by the project. Each VRM Class or VQO is defined in terms of how much visual contrast can be made to the landscape while maintaining a visually acceptable environment within the area.

National Forests were analyzed using the VMS, and public land and lands of all other ownerships were analyzed using the VRM system. The visual resources within the affected environment along the proposed route were examined for the significance which might be created by constructing the pipeline and ancillary facilities (compressor stations, maintenance yards, block valves, metering stations, communications sites, borrow sites, and associated access roads). As a result of the analysis, only the existing visual resources for those landscapes where the pipeline or its ancillary facilities would cause significant visual impacts are described in detail in the EIS. (Refer to chapter 4, 'Environmental Consequences,' for an explanation of the criteria used to determine significance of impact.)

## VISUAL RESOURCES AFFECTED BY THE PROPOSED ACTION

The proposed action would traverse the distinctive landscapes of the Middle Rocky Mountains, Colorado Plateaus, and Basin and Range physiographic provinces. Landform varies from steep mountainous areas with confined canyons in the northern portions to rolling transitional slopes and broad valley bottoms in the middle portions to a flat desert landscape with occasional contrasting mountains in the southern portion. Vegetation varies from thickly vegetated slopes in the north, through sage-covered valleys with intermingling agricultural lands in the middle, to desert vegetation with Joshua trees and barrel cactus toward the southern end. Cultural modifications of communities, utilities, mining activity, and highways are scattered throughout the area. Visual resources for those segments which would have significant adverse impacts are described more specifically in the table 3-10. Refer to the *Graphic Supplement* for location of mileposts.

Table 3-11 summarizes the number of miles and acres for each segment by VRM Class and/or VQO (based upon a 100-foot wide construction right-of-way) which would be crossed by the proposed action, alternatives, and variations.

TABLE 3-10

AFFECTED ENVIRONMENT FOR VISUAL RESOURCES: PROPOSED ACTION

| MP | VRM Class and/or VQO[2] | Description |
|---|---|---|
| **Pipeline**[1] | | |
| MP 85-MP 110 | 2 | Landform consists of valley bottoms with transitional slopes, covered with sagebrush interrupted by agriculture. Landscape dotted with small communities, Interstate 80, Highways 35 and 133, and Highway Alternative 189. Rockford Lake State Park is near MP 98. |

TABLE 3-10—Continued

| MP | VRM Class and/or VQO[2] | Description |
|---|---|---|
| MP 118-MP 123 | R,PR | The montainous slopes are vegetated with aspen, conifer pockets, and oak-brush, showing fall color. Proposed access to the Currant Creek recreation complex is within the area. |
| MP 130-MP133 | R | The gently rolling to transitional landscape is vegetated with sagebrush. U.S. Highway 40, which serves as access to the Strawberry Reservoir Recreation Area, passes through the area. |
| MP 133-MP 137 | PR | The landform surrounding the Strawberry Reservoir area consists of transitional slopes uphill from a gently rolling landscape. Vegetation is sagebrush. Area is known for intensive and expanding recreation opportunities. |
| MP 137-MP 144 | R | The intensive recreation area surrounding Strawberry Reservoir will increase as the reservoir is filled. Landform consists of gently rolling to transitional slopes. Vegetation is sagebrush, with occasional riparian vegetation. Modifications include the west shore recreation road and recreation sites, viewed from the reservoir. |
| MP 153-MP 158 | 2,R,PR | The landform consists of mountainous terrain with a steep, narrow river canyon. Vegetation consists of mountain brush and sagebrush. Area is traversed by U.S. Highways 6/50, a railroad, and proposed access to the proposed Fifth Water Reservoir. |
| MP 183-MP 190 | 3 | Landform consists of flat valley to transitional slopes. Vegetation includes sagebrush, with juniper on upper slopes. Area is traversed by Highway 132. |
| MP 190-MP 195 | 3 | Restricted steep canyon walls give rise to mountain slopes on each side. Vegetation is mainly juniper, with mountain brush higher up on slopes. Highway 132 and powerlines penetrate area. Area can be seen from Nephi. |
| MP 232-MP 235 | 2 | Landform is steep, restricted canyon, with sagebrush cover and juniper on upper slopes. U.S. Highway 91 and Interstate 15 traverse the canyon area known as Scipio Pass. |
| MP 370-MP 393 | 3,R,PR | Landform consists of mountainous terrain covered with sagebrush and scattered juniper on upper slope, Highway 18, small communites, and electrical and telephone lines are present. The proposed action would also cross the Dixie National Forest. |
| MP 495-MP 505 | 3 | Route would cross Frenchman Mountain/Rainbow Gardens Potential National Natural Landmark. Landform is gently rolling to rugged, with irregular erosional patterns which display vivid soil color and textural variety that make the area geologically unique. Creosote bush is the predominant vegetation. |
| **Ancillary Facilities** | | |
| MP 0 | MP 4 | Sage Compressor Station and Sage maintenance base. Landform is the flat valley bottom along the Bear River. Vegetation consists of mixed meadow species and sagebrush. Cultural modifications are limited to primitive roads in a rural setting. The area is located near and viewed from Highways 51/89 and 89/30N. |
| Cedar City, Utah Vicinity | MP 3 | Cedar City maintenance base. Landform is flat to gently rolling terrain with agricultural areas or sagebrush cover. Cultural modifications consist of occasional rural agricultural structures and a railroad, and may be viewed from local highways. |

[1]Only those segments and facilities which would be significantly affected by the proposed action are described.

[2]Definitions of VRM Classes

Class 1: This class provides primarily for natural ecological changes; management activities are to be restricted and are not to attract attention.

Class 2: Changes in basic elements by management activities should not be evident in the characteristic landscape.

Class 3: Contrasts to the basic elements may be evident and begin to attract attention, but they should remain subordinate to the existing characteristic landscape.

Class 4: Alterations may attract attention but should repeat the form, line, color, and texture of the characteristic landscape.

Definitions of VQO's

Preservation (P)--Allows ecological changes only. Management activities, except for very low visual impact recreation facilities, are prohibited.

Retention (R)--Activities may only repeat form, line, color, and texture which are frequently found in the characteristic landscape.

Partial Retention (PR)--Management activities must remain visually subordinate to the characteristics landscape. Activities may repeat or introduce form, line, color, or texture common to the characteristic landscape, but changes in their qualities or size, amount, intensity, direction, pattern, etc., remain visually subordinate to the characteristic landscape.

Modification (M)--Activities may visually dominate the original characteristic landscape. However, vegetative and landform alterations must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area or character type. Additional elements must remain visually subordinate to the proposed composition.

Maximum Modification (MM)--Management activities altering vegetation and landform may dominate the characteristic landscape. However, when viewed as background, the visual characteristics must be those of natural occurrences within the surrounding area or character type. When viewed as foreground or background, they may not appear to completely borrow from naturally established form, line, color, or texture.

TABLE 3-11.

SUMMARY OF TOTAL AFFECTED ENVIRONMENT FOR VISUAL RESOURCE FOR THE PROPOSED ACTION, ALTERNATIVES, AND VARIATIONS

| Route Name | Number of Miles and Acres in Each VRM Class/VQO[a] | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Class 1 | | Class 2 | | Class 3 | | Class 4 | | P | | R | | PR | | M | | [b]MM | | Totals | |
| | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres |
| **PIPELINE** | | | | | | | | | | | | | | | | | | | | |
| Proposed Action | - | - | 32 | 388 | 244 | 2,975 | 270 | 3,272 | - | - | 20 | 242 | 35 | 425 | 9 | 109 | - | - | 610 | 7,393 |
| Alternative A, Northern Systems Best Case | - | - | 17 | 206 | 24 | 291 | 36 | 436 | - | - | - | - | - | - | - | - | - | - | 77 | 933 |
| Alternative A, Northern Systems Worst Case | - | - | 17 | 206 | 24 | 291 | 179 | 2,169 | - | - | 20 | 242 | 425 | 9 | 109 | - | - | - | - | |
| Alternative B, Sanpete Valley | - | - | 39 | 473 | 275 | 3,333 | 252 | 3,055 | - | - | 20 | 242 | 35 | 424 | 9 | 109 | - | - | 630 | 7,635 |
| Alternative C, Central Nevada | - | - | 110 | 1,333 | 328 | 3,975 | 352 | 4,266 | - | - | 21 | 255 | 36 | 436 | 9 | 109 | 6 | 73 | 862 | 10,447 |
| Alternative D, Sevier-Escalante Desert | - | - | 57 | 690 | 197 | 2,388 | 306 | 3,708 | - | - | 20 | 243 | 35 | 424 | 9 | 109 | - | - | 624 | 7,563 |
| Alternative E, West Salt Lake | - | - | 35 | 424 | 169 | 2,049 | 516 | 6,254 | - | - | 17 | 206 | 11 | 133 | - | - | - | - | 748 | 9,066 |
| Alternative F,Provo Canyon | - | - | 125 | 1,516 | 202 | 2,448 | 271 | 3,285 | - | - | 7 | 85 | 14 | 170 | - | - | - | - | 619 | 7,503 |
| Variation 2, Thistle Creek | - | - | 10 | 121 | 17 | 206 | - | - | - | - | - | - | - | - | - | - | - | - | 27 | 327 |
| Variation 3, East Las Vegas | - | - | 37 | 448 | 22 | 267 | - | - | - | - | - | - | - | - | - | - | - | - | 59 | 715 |
| Variation 4, Fort Mojave | - | - | - | - | 10 | 121 | - | - | - | - | - | - | - | - | - | - | - | - | 10 | 121 |
| Variation 5, Mill Creek | - | - | 6 | 73 | - | - | - | - | - | - | - | - | 2 | 24 | 13 | 158 | - | - | 21 | 255 |
| Variation 6, Daniels Canyon | - | - | 9 | 109 | - | - | 5 | 61 | - | - | 29 | 351 | 5 | 61 | 3 | 36 | 1 | 12 | 52 | 630 |
| **ANCILLARY FACILITIES** | | | | | | | | | | | | | | | | | | | | |
| Proposed Action | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 |
| Compressor Station (1) | - | - | - | - | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - |
| Maintenance Bases (4) | - | - | - | - | - | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Alternative A, Northern Systems | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 15 |
| Compressor Station (1) | - | - | - | - | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - |
| Alternative B, Sanpete Valley | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 |
| Compressor Station (1) | - | - | - | - | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - |
| Maintenance Bases (4) | - | - | - | - | - | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Alternative C, Central Nevada | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 30 |
| Compressor Station (1) | - | - | - | - | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - |
| Maintenance Bases (6) | - | - | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Alternative D, Sevier- Escalante Desert | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 |
| Compressor Station (1) | - | - | - | - | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - |
| Maintenance Bases (4) | - | - | - | - | - | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

TABLE 3-11.—Continued

| Route Name | Number of Miles and Acres in Each VRM Class/VQO[a] | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Class 1 | | Class 2 | | Class 3 | | Class 4 | | P | | R | | PR | | M | | [b]MM | | Totals | |
| | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres |
| Alternative E, West Salt Lake Compressor Station | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 |
| (1) | - | - | - | - | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - |
| Maintenance Bases (4) | - | - | - | - | - | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Alternative F, Provo Canyon Compressor Station | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 |
| (1) | - | - | - | - | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - |
| Maintenance Bases (4) | - | - | - | - | - | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

[a]Acreage figures are based upon a 100-foot wide construction right-of-way summaries for the alternatives include those portions of the proposed action which precede and follow the alternatives, whereas summaries for the variation include only those portions which deviate from the proposed action.

[b]Refer to table 3-10 for definitions of abbreviations.

# Land Uses: Recreation Resources, Agriculture, and Conflicts with Land Use Plans, Policies, and Controls

## RECREATION RESOURCES

Recreation resources are defined as formally designated areas and informal dispersed areas that are managed by Federal, state, and local agencies in order to preserve and further the areas used for play, amusement, or relaxation. This analysis focuses on formally managed areas where the quality of the recreation experience could be directly affected by the proposed action, alternatives, and variations. Recreation lands which would be altered by any components of the proposed project or which would allow a view of construction activity, thereby affecting the natural scenic qualities of the landscape, are discussed. The amount of noise intrusion and the amount of dust and odors from construction equipment (trucks, trenchers, and bulldozers) within the proximity of a recreation site are also considered in determining the significance of impacts. For further information on the recreation areas under the management of various Federal, state, county, and city agencies which have been inventoried, see *Recreation and Wilderness Technical Report* (BLM 1981).

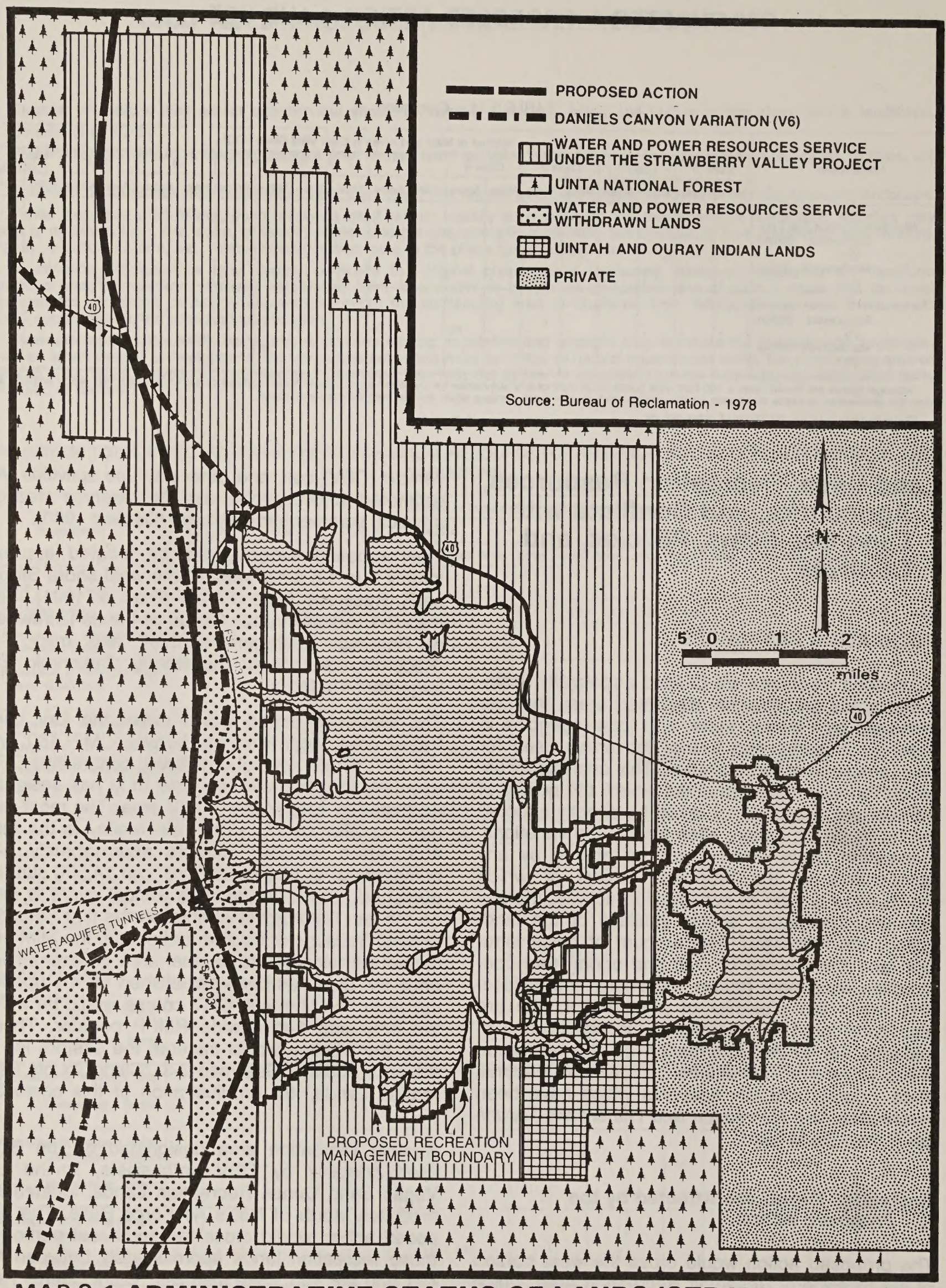
### Recreation Resources Affected by the Proposed Action

The proposed action would cross the west portion of the Strawberry Reservoir Recreation Area, which is 65 miles southeast of Salt Lake City approximately between MP 131 and MP 145. This recreation area is known for its various recreational opportunities--i.e., camping, fishing, hiking, off- road vehicle (ORV) use, and other day use activities. An estimated 40,000 people use the reservoir area on a typical summertime weekend (Daniels 1980).

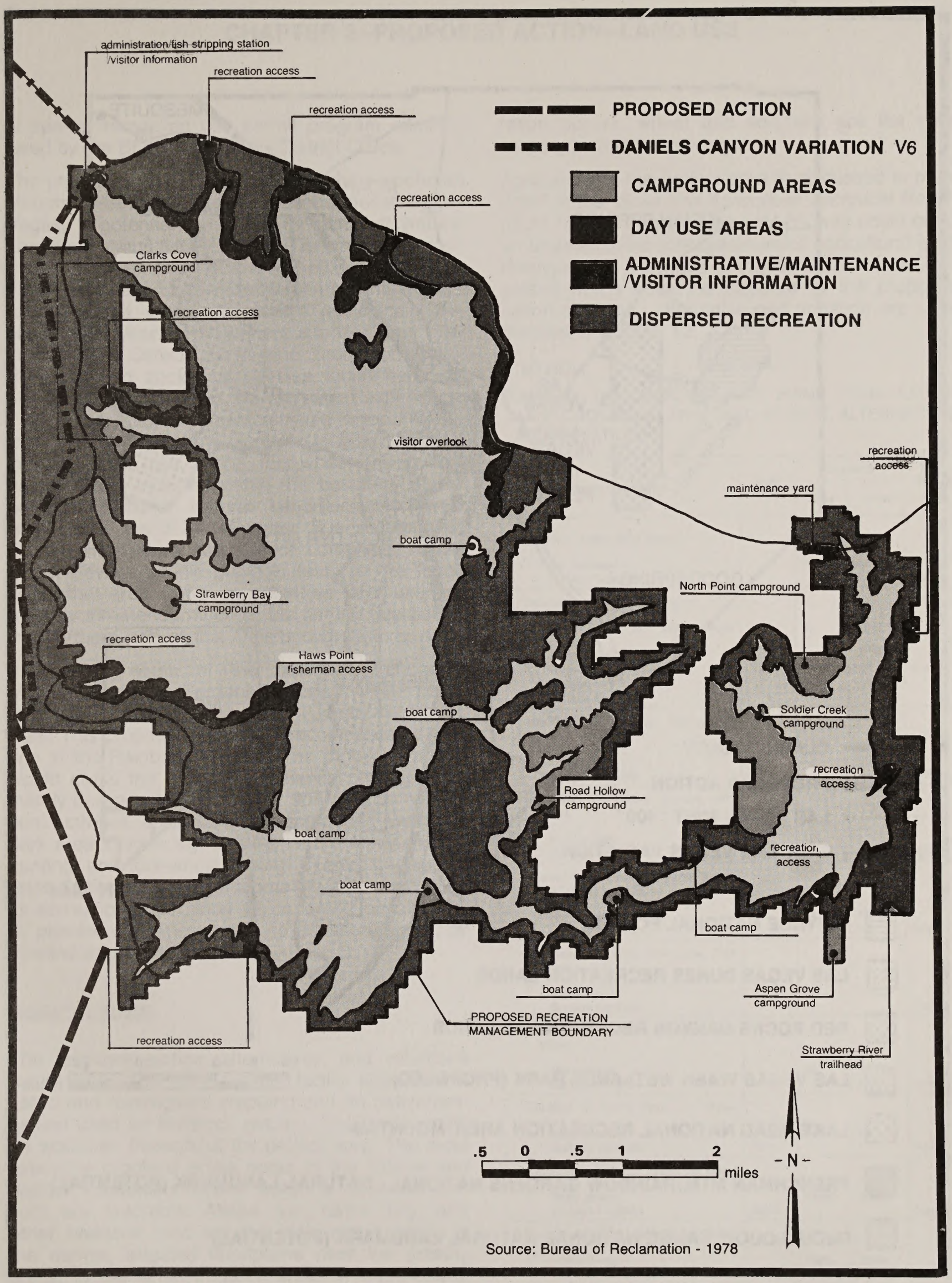
The proposed action would be located approximately 1 to 1.5 miles west of the west shore Strawberry Reservoir road (Forest Road #71031). See map 3-1 'Administrative Status of Lands (Strawberry Reservoir Enlargement-1978)' and map 3-2, 'Recommended Plan (Strawberry Reservoir Enlargement-1978).'

The proposed action would cross the Dry Lake Valley area, approximately between MP 480 and MP 487, where several organized, competitive ORV events take place annually. The BLM has designated this area as an 'open' ORV area. The most recognized ORV event in Dry Lake Valley is the Mint 400, which annually attracts approximately 500 competitors, 45,000 spectators, and 14,500 support personnel (BLM 1980b). This annual event is held on the last Saturday in April or on the first Saturday in May. Because of its size and scope, the Mint 400 cannot be relocated to another area or rescheduled once the date has been established for the upcoming year. The Mint 400 ORV course would be within the proposed 1-mile wide RMPP corridor. Therefore, the pipeline would traverse the eastern leg of the race course. (See map 3-3, 'Clark County Recreation Lands,' for an illustration of this conflicts.)

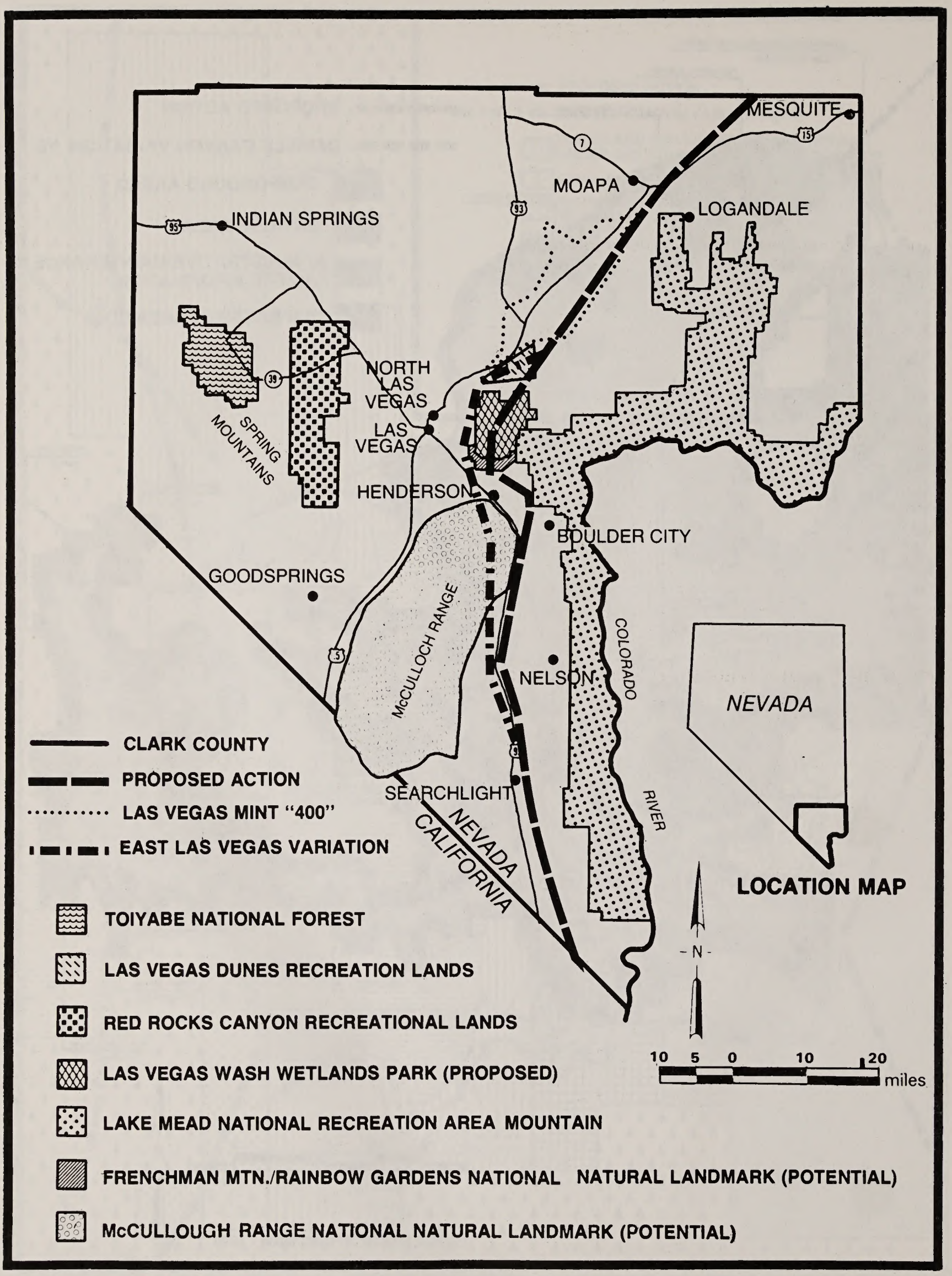
Another recreation area designated by the BLM, used primarily by ORV enthusiasts, is the Las Vegas Sand Dunes Recreation Lands, located immediately north of Nellis Air Force Base. The proposed action would cross the southeast portion of these recreation lands approximately between MP 491 and MP 493. (See map 3-3, 'Clark County Recreation Lands,' for this location.) The Las Vegas Sand Dunes Recreation Lands is the most intensely used ORV area in southern Nevada. Nearly 30 organized events occur there annually under a Feder-




MAP 3-1 **ADMINISTRATIVE STATUS OF LANDS (STRAWBERRY RESERVOIR ENLARGEMENT - 1978)**




MAP 3-2 RECOMMENDED PLAN (STRAWBERRY RESERVOIR ENLARGEMENT – 1978)




MAP 3-3 CLARK COUNTY RECREATION LANDS

al special recreation use permit program administered by the BLM's Las Vegas District Office.

The proposed action would traverse the Frenchman Mountain-Rainbow Gardens area northeast of Las Vegas, a potential candidate for National Natural Landmark status (HCRS 1980). The area is approximately between MP 496 and MP 502. (See map 3-3 for this location.) The Frenchman Mountain-Rainbow Gardens area is important geologically because more years of history are exposed here than in the Grand Canyon (Szark and Thompson 1980). Botanical and zoological species found here are also of primary value to the recreation experience. Typical recreational pursuits enjoyed in the Frenchman Mountain-Rainbow Gardens include sightseeing, equestrian use, hiking, four-wheel driving, and nature study. Included within the boundary of the potential National Natural Landmark (northwest quadrant) is the BLM-designated Sunrise Mountain Outstanding Natural Area, which comprises 13,120 acres. Several scenic geologic features are found within that area; however, extensive ORV use has recently threatened much of the natural qualities of the northern half of this Outstanding Natural Area.

Immediately south of the potential Frenchman Mountain-Rainbow Gardens National Natural Landmark lies the proposed Clark County Wetlands Park. This proposed park also encompasses a portion of the Rainbow Gardens. The proposed action would cross the proposed wetlands park approximately between MP 500 to MP 505. Typical recreation activities enjoyed in the proposed wetlands park area include sightseeing, nature study, hiking, hunting, and four-wheel driving. Scenic, geological, and wildlife values all contribute toward a high quality recreation experience which would be affected by pipeline construction and, to a lesser degree, by pipeline operation.

## AGRICULTURE

The proposed action, alternatives, and variations would cross and have surface facility sites on irrigated and nonirrigated cropland and on native rangeland used for livestock grazing. Croplands would be scattered throughout the project area. The most extensive cropland areas occur in the valleys and narrow floodplains where water is available and soils are favorable. Alfalfa hay, native hay, and other livestock feed are the main crops grown in the narrow, irrigated floodplains near the grazing areas. In the larger irrigated areas in Utah, alfafa, hay and seed, corn, potatoes, beans, truck garden crops, small grains, and some sugar beets are the principal crops. Some small areas in Utah are used for orchard fruit production. Nonirrigated farming is conducted in areas where favorable annual precipitation occurs; wheat and sorghum are the main crops grown in these areas.

Agriculture of the project area is discussed in more detail in the *Soils and Agriculture Technical Report* (BLM 1981c). The pipeline right-of- way could cross an undetermined acreage of prime agricultural land. Mileages and acreages of cropland and nature rangeland which would be affected by the proposed action and each alternative and variation are summarized in table 3- 12.

TABLE 3-12.

SUMMARY OF CROPLAND AND PRIME AGRICULTURAL LAND CROSSED BY PROPOSED ACTIONS, ALTERNATIVES, AND VARIATIONS

| Project Component | Number[1] | Cropland | | Prime Agricultural Land[2] |
|---|---|---|---|---|
| | | Miles | Acres | |
| Proposed Action (610 Miles) | | | | |
| Right-of-way[3] | | 88 | 1,065 | |
| Surface Facilities[4] | 1 | | 5 | None |
| Alternative A, Northern Systems | | | | |
| Right-of-way (255 Miles, Worst Case) | | 88 | 1,065 | |
| Surface Facilities | | | | |
| Right-of-way (77 Miles, Best Case) | | 43 | 521 | None |
| Surface Facilities | | | | |
| Alternative B, Sanpete Valley (630 Miles) | | | | |
| Right-of-way | | 131 | 1,585 | |
| Surface Facilities | 1 | | 5 | None |
| Alternative C, Central Nevada (862 Miles) | | | | |
| Right-of-way | | 107 | 1,295 | |
| Surface Facilities | 1 | | 5 | None |
| Alternative D, Sevier-Escalante Desert (622 Miles) | | | | |
| Right-of-way | | 84 | 1,016 | |
| Surface Facilities | 1 | | 5 | None |
| Alternative E, West Salt Lake (747 Miles) | | | | |
| Right-of-way | | 87 | 1,053 | |
| Surface Facilities | | | | None |
| Alternative F, Provo Canyon (619 Miles) | | | | |
| Right-of-way | | 99 | 1,198 | |
| Surface Facilities | 1 | | 5 | None |
| Variation 2, Thistle Creek (27 Miles) | | | | |
| Right-of-way[3] | | 5 | 61 | |
| Surface Facilities[4] | None | | | None |
| Variation 3, East Las Vegas (59 Miles) | | | | |
| Right-of-way | | None | None | |
| Surface Facilities | None | | | None |
| Variation 4, Fort Mojave (10 Miles) | | | | |
| Right-of-way | | None | None | |
| Surface Facilities | None | | | None |
| Variation 5, Mill Creek (21 Miles) | | | | |
| Right-of-way | | None | None | |
| Surface Facilities | None | | | None |
| Variation 6, Daniels Canyon (52 Miles) | | | | |
| Right-of-way | | 6 | 73 | |

TABLE 3-12.—Continued

| Project Component | Number[1] | Cropland | | Prime Agricultural Land[2] |
|---|---|---|---|---|
| | | Miles | Acres | |
| Surface Facilities | None | | | None |

[1]Number of surface facility sites (compressor stations and maintenance bases) located on cropland.

[2]Prime agriculture land is identified only for surface facilities.

[3]Construction right-of-way is considered to be temporary disturbance.

[4]Surface facility sites are considered permanent disturbance that would cause a land use change for the life of the project. Surface facility sites considered to have significant acreages are compressor stations and maintenance bases. Specific sites of surface facilities are not available, estimates were made only for the Sage Compressor Station and Heber City maintenance base.

### Agriculture Affected by the Proposed Action

The proposed action would traverse 88 miles of cropland and an undetermined acreage of prime agricultural land. Since surface facilities associated with the proposed action could take cropland out of production for the life of the project (20 years), each major surface facility location was evaluated to determine existing land use and whether the facility would be located on prime agricultural land. The proposed compressor station near Sage, Wyoming, would be located on native grazing land and not on prime agricultural land. Land use for the remaining surface facility sites (maintenance bases) associated with the proposed action is not known because specific site locations are not available at this time.

An agriculture experiment station is located within the proposed corridor approximately 6 miles south of Nephi, Utah (MP 199).

### CONFLICTS WITH LAND USE PLANS, POLICIES, AND CONTROLS

The Uinta National Forest personnel are in the midst of preparing their Land Management Plan pursuant to the Resource Planning Act of 1975. The proposed Forest Land Management Plan for the Uinta National Forest in Utah includes a Utility Corridor Rule based on existing utilities and forest resources including wildlife, soils, and visual values. The proposed action would cross the Uinta National Forest but would not coincide with the areas designated for consideration as utility corridors.

The proposed action would also cross through the expansion of the Moapa Indian Reservation in Nevada. Recent legislation transferred over 70,000 acres from BLM administration to the reservation. As part of the legislation, a 3,000-foot wide corridor through this area was designated for utilities. BLM will adminster the granting of such rights-of-way. The policy of the BLM Nevada State Director is to use the corridor wherever possible. The proposed action would parallel but would not be within the 3,000-foot wide corridor.

The proposed action would traverse the area covered by the proposed Clark County Wetlands Park in southern Nevada. The county has plans to issue a Draft Management Master Plan in June 1981. The final RMPP EIS will include analysis to determine whether the RMPP would conflict with this draft management plan.

## Socioeconomics

Most of the counties where the proposed compressor stations, pipeline, maintenance bases, and communication facilities would be located are rural, with 1980 population densities ranging from 0.3 to 9.5 people per square mile. Very little housing exists near the facilities except where the pipeline would skirt Las Vegas and in north-central Utah, where housing is plentiful in the nearby Salt Lake City metropolitan area. In parts of southern Utah, housing is also available because of the tourist industry associated with Bryce Canyon and Zion National Parks and the Cedar Breaks National Monument. The southern 27 miles of the pipeline in California would cross sparsely populated open range. Needles, California, and Bullhead City, Arizona, are the only communities with housing and services within 60 miles of this segment.

The regions which would be affected by the compressor station, pipeline, maintenance base, and communication construction crews and their pertinent socioeconomic characteristics are listed in table 3-13. The regions were defined by the locations of construction spreads, with availability of short- term housing and driving distance also taken into account.

Table 3-14 lists the socioeconomic characteristics of the towns which could be affected by the double-jointing yard crews. These towns were selected on the basis of their proximity to the potential sites. The applicant has stated that these locations are tentative and subject to change. (The figures presented in table 3-14 are part of the total socioeconomic profile presented in table 3-13; they do not represent an addition to the existing socioeconomic base.)

The property tax base would be affected in the counties where the facilities would be located. Recent property tax revenues of these counties are listed in table 3-15.

TABLE 3-13

REGIONAL SOCIOECONOMICS PROFILE: RMPP

| Construction | MP[a] | Region | | Estimated 1980 Population | 1979 Employment | | Total Personal Income (Million $) | Retail Sales 1977 ($1,000) | Medical Facilities | | | Housing | | Police (State, County, Local) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | State | Counties | | Total Employed | Total Unemployed | | | Number Hospital | Total Beds | Total Physicians | Hotel and Motel Rooms | Private Campsites with Services | |
| Sage Compressor Station | 0 | Wyoming<br>Utah | Lincoln<br>Rich, Cache | 85,506 | 28,951 | 1,316 | 283.06 | 187,299 | 2 | 150 | 51 | 275 | 163 | 111 |
| Pipeline Spread 1 | 0-100 | Wyoming<br>Utah | Lincoln, Uinta<br>Rich, Cache, Summit, Weber, Morgan, Salt Lake | 839,498 | 334,847 | 17,207 | 4,231.22 | 2,796,799 | 11 | 2,249 | 971 | 9,332 | 1,215 | 937 |
| Pipeline Spread 2 | 100-180 | Utah | Summit, Salt Lake, Wasatch, Utah, Sanpete, Juab | 825,550 | 360,873 | 15,940 | 3,981.32 | 2,644,835 | 13 | 2,204 | 860 | 2,055 | 1,417 | 1,055 |
| Pipeline Spread 3 | 180-300 | Utah | Utah, Juab, Millard, Sevier, Beaver, Iron | 255,350 | 97,505 | 4,191 | 949.88 | 664,429 | 10 | 731 | 169 | 3,201 | 936 | 338 |
| Pipeline Spread 4 | 300-400 | Utah | Beaver, Iron, Washington | 44,350 | 17,232 | 762 | 161.59 | 154,406 | 4 | 168 | 32 | 2,391 | 665 | 78 |
| Pipeline Spread 5 | 400-500 | Utah<br>Nevada | Washington<br>Lincoln, Clark | 487,859 | 194,357 | 11,546 | 2,391.91 | 1,793,311 | 8 | 1,701 | 515 | [b]33,124 | 3,162 | 456 |
| Pipeline Spread 6 | 500-583 | Nevada | Clark | 462,012 | 184,640 | 11,161 | 2,299.09 | 1,708,529 | 7 | 1,636 | 500 | [b]32,172 | 3,274 | 418 |
| Pipeline Spread 7 | 583-610 | Arizona<br>California | Mohave<br>San Bernardino | 23,500 | 11,153 | 781 | 138.73 | 86,508 | 2 | 222 | 26 | 557 | 577 | 100 |
| [d]Sanpete Valley Alternative | | Utah | Utah, Sanpete | 234,250 | 88,281 | 3,989 | 868.03 | 576,654 | 6 | 583 | 153 | 1,697 | 549 | 282 |
| Pipeline Spread 1 | | | Sevier, Piute | | | | | | | | | | | |
| Pipeline Spread 2 | | Utah | Millard, Sevier, Garfield, Piute, Beaver, Iron, Washington | 74,750 | 29,551 | 1,321 | 271.59 | 227,373 | 8 | 274 | 46 | 3,386 | 861 | 130 |
| [d]Sevier-Escalante Desert Alternative | | Utah | Sanpete, Juab, Sevier, Millard, | 68,150 | 26,235 | 1,357 | 238.4 | 183,405 | 9 | 264 | 40 | 2,159 | 779 | 111 |
| Pipeline Spread 1 | | | Beaver, Iron | | | | | | | | | | | |
| Pipeline Spread 2 | | Utah | Beaver, Iron, Washington | 44,350 | 17,244 | 762 | 161.59 | 154,406 | 4 | 168 | 32 | 2,383 | 665 | 78 |
| [c]Maintenance Bases Sage | 0 | Wyoming<br>Utah | Lincoln<br>Rich, Cache | NA | NA | NA | 283.06 | 187,299 | NA | NA | NA | NA | NA | NA |
| Heber City | NA | Utah | Wasatch | NA | NA | NA | 16.488 | 22,452 | NA | NA | NA | NA | NA | NA |
| Nephi | 195 | Utah | Juab | NA | NA | NA | 11.358 | 14,406 | NA | NA | NA | NA | NA | NA |
| Cedar City | NA | Utah | Iron | NA | NA | NA | 48.334 | 64,214 | NA | NA | NA | NA | NA | NA |
| Las Vegas | NA | Nevada | Clark | NA | NA | NA | 2,316.063 | 1,708,529 | NA | NA | NA | NA | NA | NA |

Note: NA means not applicable.

[a]Mileposts were projected from the applicant's estimate of 100 miles per spread in rolling terrain and 80 miles per spread in mountainous terrain.

[b]Las Vegas has 31,846 rooms.

[c]Population, employment, personal income, and retail sales data for the Needles and Bullhead City area have been estimated from county data.

[d]The Sanpete Valley and Sevier-Escalante Desert Alternative spreads 1 and 2 would replace pipeline spreads 3 and 4, respectively, of the proposed route.

[e]Because the maintenance bases would be constructed by local construction, no new construction personnel would be added. Therefore, only income effects are analyzed.

Sources: Appendix A, tables A-1, A-2, A-3, A-4, A-5, A-6, A-7.

TABLE 3-14

REGIONAL SOCIOECONOMIC PROFILE: DOUBLE-JOINTING YARD LOCATIONS

| Double Jointing Yards | [a]MP | Region | | | [b]2979 Employment | | | [c]Total 1977 Personal Income (Million $) | Local 1978 Retail Sales ($1,000) | Medical Facilities | | | Housing | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | State | Counties | Nearest Town | Estimated 1977 Population | Total Employed | Total Unemployed | | | Number of Hospitals | Total Beds | Total Physicians | Hotel and Motel Rooms | Private Campsites With Services | Police (State, County, Local) |
| 1 | 50 | Wyoming | Uinta | Evanston | 4,861 | 5,091 | 104 | 27.60 | 19,769 | 1 | 22 | 4 | 360 | 76 | 16 |
| 2 | 157 | Utah | Utah | Provo | 55,577 | 76,409 | 3,267 | 229.37 | 191,867 | 1 | 335 | 76 | 850 | 265 | 122 |
| 3 | 210 | Utah | Juab | Nephi | 3,015 | 1,971 | 121 | 11.36 | 14,406 | 1 | 31 | 3 | 180 | 157 | 16 |
| 4 | 255 | Utah | Millard | Fillmore | 1,882 | 3,439 | 114 | 7.91 | 4,248 | 1 | 22 | 3 | 137 | 43 | 14 |
| 5 | 346 | Utah | Iron | Cedar City | 20,960 | 7,048 | 332 | 48.33 | 64,214 | 1 | 59 | 14 | 670 | 142 | 26 |
| 6 | 459 | Nevada | Clark | Las Vegas | 161,086 | 184,639 | 11,161 | 103.32 | 2,299,090 | 4 | 1,636 | [d]500 | 31,846 | 2,249 | 418 |
| 7 | 517 | Nevada | Clark | Boulder City | 6,658 | 184,639 | 11,161 | 53.00 | 16,504 | 1 | 1,636 | [d]500 | 115 | 75 | 418 |
| 8 | 599 | California | San Bernardino | Needles | 3,726 | [e]3,750 | [e]339 | 25.27 | 24,972 | 1 | 39 | 12 | 326 | 404 | 24 |

[a]The applicant has not finalized its double-jointing yard plans; therefore, these locations are subject to change. Potential railheads for the alternative have not been identified.

[b]County data are used because community data are not avialable.

[c]Derived by multiplying county per capita income by community population.

[d]Includes all of Clark County.

[e]Estimate of employment in eastern San Bernardino County based on county population/employment ratio.

Sources: Appendix A, tables A-1, A-3, A-4, A-5, A-6, A-7.

TABLE 3-15

PROPERTY TAX REVENUES OF COUNTIES WHICH WOULD BE CROSSED BY THE PROPOSED ROUTE, ALTERNATIVES, AND VARIATIONS

| County | State | Tax Receipts, 1979 ($) |
|---|---|---|
| **RMPP** | | |
| Lincoln | Wyoming | 8,646,000 |
| Rich | Utah | 795,000 |
| Summit | Utah | 6,531,000 |
| Wasatch | Utah | 1,471,000 |
| Utah | Utah | 33,790,000 |
| Sanpete | Utah | 1,695,000 |
| Juab | Utah | 1,328,000 |
| Millard | Utah | 2,280,000 |
| Beaver | Utah | 965,000 |
| Iron | Utah | 4,358,000 |
| Washington | Utah | 4,299,000 |
| Lincoln | Nevada | 780,000 |
| Clark | Nevada | 90,623,000 |
| San Bernardino | California | 177,497,000 |
| **Sanpete Valley Alternative** | | |
| Sanpete | Utah | 1,695,000 |
| Sevier | Utah | 2,125,000 |
| Piute | Utah | 286,000 |
| Garfield | Utah | 821,000 |
| Iron | Utah | 4,358,000 |
| **Sevier-Escalante Desert Alternative** | | |
| Juab | Utah | 1,328,000 |
| Millard | Utah | 2,280,000 |
| Beaver | Utah | 965,000 |
| Iron | Utah | 4,358,000 |
| **West Salt Lake Alternative** | | |
| Bear Lake | Idaho | 1,882,000 |
| Franklin | Idaho | 1,800,000 |
| Cache | Utah | 7,940,000 |
| Box Elder | Utah | 6,572,000 |

TABLE 3-15—Continued

| County | State | Tax Receipts, 1979 ($) |
|---|---|---|
| Tooele | Utah | 4,430,000 |
| Juab | Utah | 1,328,000 |
| Millard | Utah | 2,280,000 |
| **Provo Canyon Alternative** | | |
| Wasatch | Utah | 1,471,000 |
| Utah | Utah | 33,790,000 |
| Juab | Utah | 1,323,000 |
| **Thistle Creek Variation** | | |
| Utah | Utah | 33,790,000 |
| Sanpete | Utah | 1,695,000 |
| **East Las Vegas Variation** | | |
| Clark | Nevada | 90,625000 |
| **Fort Mojave Variation** | | |
| San Bernardino | California | 177,497,000 |
| **Mill Creek Variation** | | |
| Utah | Utah | 33,790,000 |
| **Daniels Canyon Variation** | | |
| Wasatch | Utah | 1,471,000 |
| Utah | Utah | 33,790,000 |

Sources: Appendix A, table A-8.

## Native American Issues

Two indian reservations would be crossed by the proposed action.

### MOAPA INDIAN RESERVATION

The Moapa Indian Reservation is located in the northeastern part of Clark County, Nevada, 75 miles north of Interstate 15 off Nevada Highway 7 (approximately between MP 460 and MP 470).

The Moapa tribal employment survey conducted by the personnel manager in September 1978 indicates a potential work force of 119, with 62 people employed full or part time on the reservation and 11 people employed full or part time off the reservation. This indicates a current unemployment rate of 38.7 percent. However, personnel employed under the Comprehensive Employment Training Act are calculated as unemployed; this adjusted unemployment rate becomes 48 percent (Facilitators 1980). A comparison of earning levels of men and women shows that 71 percent of the men and 47 percent of the women earn over $5,000 annually.

The Moapa Indian Reservation is involved in several tribal enterprises, including farming, a leather shop, a grocery store, and a greenhouse for growing tomatoes (Facilitators 1980). One source of income to the tribe is leasing right-of-way corridors across tribal lands. The tribe is receiving $26,000 annually for an existing high power transmission line that is located within an established utility corridor which crosses the reservation (Facilitators 1980).

### FORT MOJAVE INDIAN RESERVATION

The 41,884-acre Fort Mojave Indian Reservation is located along both sides of the Colorado River in Arizona, California, and Nevada. The tribal headquarters is located in Needles, California. That portion of the reservation that would be affected by 4.5 miles of the RMPP construction is located in San Bernardino County, California, between MP 590.9 and MP 595.4.

According to the BIA, there are 650 enrolled Indians on the Fort Mojave Reservation: 383 live on or near the reservation; 147 of the 383 make up the available labor force--88 men, 59 women. Eighty-three of these are permanently or temporarily employed--51 men and 32 women. Sixty-four--43 men and 21 women--or 43.5 percent of the available work force are umemployed.

The reservation is involved with nine commercial and agricultural enterprises, and the long range plans calls for a total of 12 to 15 projects. This would afford job potential for 100 to 150 Indians (BIA 1981).

In 1974, the agricultural land produced $14,720, while the commercial lease produced $157,225. The 1978 tribal income was $300,000; personal income was $600,000 (BIA 1981).

## Cultural Resources

This chapter discusses only those cultural resources that may be affected by the proposed project, alternatives, or variations. For a detailed account of the prehistoric and historic cultural resources in the study area refer to the *Cultural Resource Technical Report* (Museum of Northern Arizona 1981).

A summary of the known cultural resources near the proposed action, alternatives, and variations, based on recorded information and previous archaeological studies, is presented in the *Cultural Resources Technical Report*. A listing of recorded properties on or nominated to the National Register of Historic Places is presented in appendix L. Recorded resources not on the National Register of Historic Places have not been evaluated for inclusion in the National Register.

Intensive field surveys have not been made. Should a pipeline route be approved, intensive field inventories would be made during the preliminary pipeline staking to locate, evaluate, and recommend mitigation for cultural resources within the potential impact area.

The discussion of cultural resources for the proposed action also applies to Variations 2, 5, and 6. Other alternatives and variations are discussed where they differ from the proposed action.

### CULTURAL RESOURCES AFFECTED BY THE PROPOSED ACTION

The proposed route would traverse areas that have supported extensive human occupation extending from pre Paleo-Indian time to the present. Within this considerable time span, regional population patterns have fluctuated according to environmental and/or socioeconomic constraints. These population patterns have been assigned by prehistorians to one of four cultural periods: Paleo-Indian (ca. 12,000 B.P. to 8,000 B.P.), archaic (ca. 10,000 B.P. to 2,000 B.P.), formative (ca. 2,000 B.P. to 800 B.P.), and postformative. The manifestations of these cultural periods, however, are not uniform throughout the project area. For example, the formative period occurs primarily in Utah and southern Nevada.

# CHAPTER 3--PROPOSED ACTION--CULTURAL RESOURCES

## History

During historic times, several ethnic and cultural groups settled the area which would be traversed by the proposed route. Spanish and Mexican explorers came from the south and east, mountain men came to trap fur-bearing animals, and followers of the Church of Jesus Christ of Latter Day Saints came to settle and maintain their religious beliefs. Most of the historic sites remaining are the result of the latter settlement and occupation of Utah. All of these groups represent part of the westward American expansion that crossed the proposed route area in several locations.

## Prehistory

Most of the prehistoric cultural resources which would be traversed by the proposed action fall into three major categories: residential sites and base camps, field and temporary camps, and special activity areas such as petroglyph and pictograph locations. The three categories probably include cultural resources representative of all four cultural periods outlined previously, although petroglyphs and residential sites are not well documented during the Paleo-Indian period.

Previous archaeological studies conducted in the Eastern Great Basin are pertinent to the proposed pipeline route (Fowler *et al.* 1978; Lindsay and Sargent 1979; Woodward-Clyde 1980). The studies indicated that a large majority of cultural resources are located near water resources. This includes both extinct and modern water sources, as well as areas containing riparian vegetation, which correspond to a high water table.

Generally, areas around water resources contain numerous residential base camps, which include a variety of artifacts for processing resources, and/or seasonal use camps where food processing has occurred. Site type definitions are derived from *Cultural Resources Existing Data Inventory: Richfield District* and *Cultural Resources Existing Data Inventory: Salt Lake City District*. (Hull and Avery 1980; James and Singer 1980). Streams and floodplains which would be traversed by the proposed action have been identified. All of these areas have a high potential for cultural resources.

The proposed action would traverse approximately 42 miles of pinyon- juniper vegetation. Previous archaeological studies indicate that areas of this vegetation type contain a high to moderate site density of seasonal use camps (Thomas 1973; Bettinger 1978; Jenningset al.1980). Many of these sites are thought to represent seasonal food procurement stations (Hull and Avery 1980). Estimates of site density are based on large block surveys conducted by D.N. Forsyth (1980) and Halbirt and Gualtieri (1981).

The proposed action would traverse approximately 103 miles of sagebrush, 37 miles of saltbush-greasewood, and 193 miles of creosote bush vegetation. Previous studies indicate a low to moderate site density in these areas. Most sites identified are seasonal use camps or field camps. Site density increases with elevation and proximity to water.

The proposed action would traverse approximately 101 miles of mountain brush and 46 miles of forest vegetation types. Previous studies indicate low to moderate site density in these areas. Seasonal campsites are the principal sites found. Estimates are based on surveys conducted by Lindsay and Sargent (1979) and Simms (1979).

Known archaeological sites in the area which would be traversed by the first 50 miles of the proposed action include the Woodruff Bison Kill (Shields 1976), a Fremont-affiliated hunting camp. Data extrapolated from similar upland environments indicate that there should be seasonal hunting and gathering campsites and special use sites. A high site density can be projected for the valley slopes of the several perennial streams which would be crossed in this area.

After MP 80, the proposed action would traverse the slopes of the Kamas Valley. Seasonal hunting and gathering camps and special use sites would be the primary site types whose density depend on elevation. South of the Kamas Valley (near MP 125 to MP 150), the terrain becomes more diverse and probably contains a low to moderate site density. Seasonal hunting and gathering camps should be the principal site types.

The Nephi mounds near MP 196 represent an important Fremont site listed on the National Register of Historic Places (Sharrock and Marwitt 1967). In this area, the pipeline would transect a diverse terrain consisting of mountains and valleys. The site density in the higher elevations is projected as low to moderate, with field camp sites predominating.

Beyond MP 175, known cultural resources indicate Paleo-Indian through Shoshonean occupations. Site types vary; however, in the valley bottoms near water resources, habitation sites (sedentary villages) can be expected. Pharo Village (Marwitt 1968) near MP 230 and Wildhorse Canyon obsidian quarry near MP 300 are listed on the National Register of Historic Places.

The proposed action would cross the Mineral Mountains (near MP 300) in a pass known to contain numerous Archaic sites and a Paleo-Indian site, which contains fluted points. This area should be considered highly sensitive.

The pipeline would follow the Santa Clara River drainage and the edge of the Escalante Desert. The projected site density for these areas is moderate to high, with numerous residential sites. Numerous habitation sites occur along the Santa Clara River.

High site densities have been documented for Meadow Valley and Moapa Valley. The known sites reflect sedentary settlement patterns. Site variability is predicted to be high.

The proposed action would pass near Gypsum Cave in the Frenchman Mountains and the Las Vegas Wash Archaeological District, listed on the National Register of Historic Places. Previous research indicates both a long cultural sequence and high site density for the Las Vegas vicinity.

## Geology and Topography

The proposed project and its alternatives and variations would extend across Utah, Nevada, and California and small areas of Oregon, Idaho, and Wyoming. Although these states contain some of the most fascinating geology in the United States, only those features which could pose a hazard to the project are analyzed in detail. The project would have no impact on any geological structures or processes, except landsliding and erosion; consequently, there will be no discussion in this EIS of the environmental consequences to geology. Erosion is discussed in detail in 'Soils'. Geologic hazards which will be analyzed include earthquake-related hazards (ground shaking and faulting), volcanic hazards (lava flows and ash falls), landslides, and subsidence. The discussion of landslides and subsidence will include those which are earthquake-induced.

Earthquakes may affect structures, including pipelines and compressor stations, in several ways. The most widespread damage may result directly from ground shaking or from secondary phenomena caused by shaking such as liquefaction, landslides, and subsidence. Localized damage may result from faulting.

The effect of earthquakes on structures may be described by the observed intensity of damage, represented by the Modified Mercalli Intensity (MMI) Scale of 1931, shown in table 3-16. A more objective means of describing an earthquake's potential damage--ground acceleration--is expressed as a percentage or a fraction of gravity (g). For example, an untethered object subjected to a 100-percent g (1.0 g) vertical earthquake acceleration would be thrown up off the ground.

TABLE 3-16

MODIFIED MERCALLI INTENSITY SCALE OF 1931

(ABRIDGED)

I. Not felt except by a very few under especially favorable circumstances.

II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.

III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motorcars may rock slightly. Vibrations like passing truck. Duration estimated.

IV. During the day, felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, and doors disturbed; walls make a creaking sound. Sensation like heavy truck striking building. Standing motorcars rocked noticeably.

V. Felt by nearly everyone; many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbance of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.

VI. Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.

VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures. Some chimneys broken. Noticed by persons driving motorcars.

VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motorcars disturbed.

IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.

X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Water splashed (slopped) over banks.

XI. Few, if any (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.

XII. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

Although ground shaking is seldom of consequence to a buried welded-steel pipeline when it is not associated with secondary effects such as landsliding, it can affect compressor stations and other above-ground appurtenant structures. These facilities would be constructed to at least the requirements of the Uniform Building Code (UBC). The proposed project would cross UBC earthquake risk zones 2 and 3, implying that MMI intensities of VII and above could be expected.

Major hydrocarbon transmission pipelines are frequently designed to continue operation or shut down operations in an orderly manner during an earthquake with a mean recurrence interval of 500 years. Figure 3-2 estimates the accelerations in bedrock which, based on historic earthquakes, have only a 10-percent probability of being exceeded in 50 years and represent the estimated earthquake ground shaking hazards to the proposed project, its alternatives, and the variations. That probability level corresponds to a to a mean recurrence interval of about 500 years for the ground shaking expected at any given point.

During larger earthquakes (MMI of VII and above), faulting may occur. Published maps of the geology of each state allow identification of presently known geologic faults upon which displacement has occurred within the past 2 million years. These faults are considered potentially active and, consequently, a threat to structures placed on or near them. No estimate has been made of the amount of potential displacement on each fault. Although such estimates would have to be made before the actual pipeline crossing was designed, this information is not necessary to compare the relative hazard along the routes. Within Utah, all but the West Salt Lake Alternative would cross the Wasatch Front and faults related to it; therefore, except for the number of miles of pipeline at risk, the precise characteristics of the faulting are not important to this discussion. The routes may be compared simply by counting the number of faults crossed.

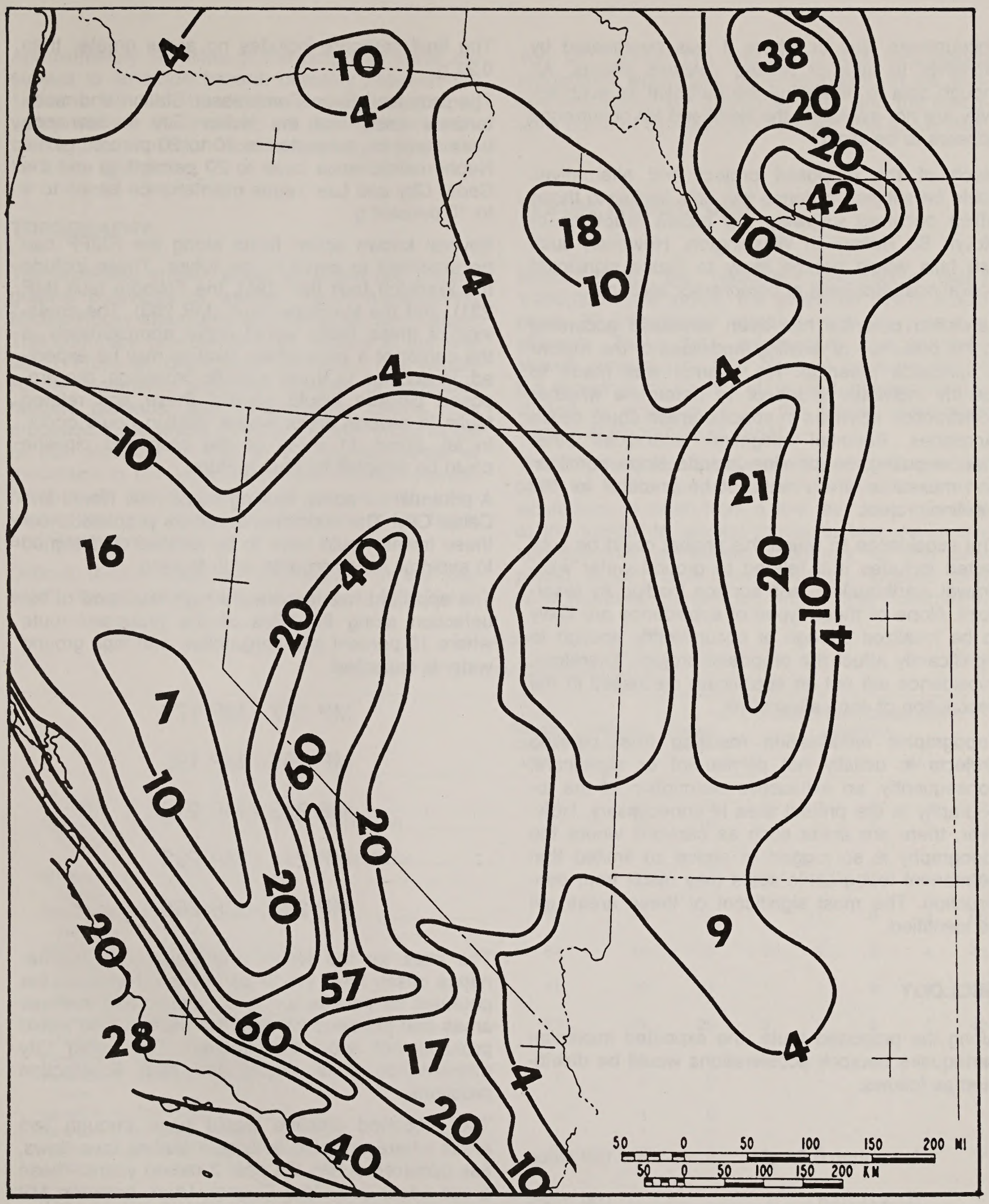
Although the most desirable means of avoiding fault hazard is to avoid the fault entirely, it is not always possible to do that, with a continuous, linear utility such as a pipeline. Fortunately, as long as the pipeline is not rigidly constrained by the ground, it can theoretically withstand more than 5 feet of faulting, depending on the specific pipeline design and the nature of the faulting. Special construction techniques to avoid or reduce ground constraints include using both a trench with shallowly dipping sides and granular backfill material, which allow the pipeline to be lifted from the trench rather than being sheared by the trench walls as faulting occurs. In addition, the pipeline can be directed across a fault so that if fault movement occurs, the pipeline will be stretched or flexed rather than buckled by compression.

Ground liquefaction may occur when saturated or nearly saturated soils are shaken during an earthquake. When this happens, the pressure of water within the soil exceeds the forces holding the soil particles together, causing the mixture to act as a liquid: dense things, such as foundations, sink; buoyant things, such as natural gas pipelines, rise to the surface. In addition, if liquefaction occurs on sloping ground, the resulting movement downslope could result in pipeline rupture, a less likely occurrence on level ground.

Neither detailed soil studies nor ground water information necessary to determine liquefaction potential are available for most of the affected area. Therefore, liquefaction has been identified as a potential hazard where high levels of ground shaking are expected and shallow ground water is likely. High ground shaking is arbitrarily defined for this purpose as 0.15 g.

If the potential damage to the pipeline and/or associated risk to the population warranted preventive design against liquefaction hazard, the pipeline could be weighted using river crossing techniques. This would prevent the pipeline from floating to the surface and would reduce or eliminate potential stress resulting from such flotation. This method could be used in those areas where liquefaction on level ground might pose a hazard. Mitigation in sloping terrain, which would be quite difficult and expensive, would probably not be attempted. Mitigation of the unstable foundation conditions associated with liquefaction potential at maintenance bases or compressor stations could be accomplished by relocation, removal of the liquefiable soils, dewatering the site, or placement of important equipment or structures on a pile foundation.

Volcanic activity is considered to be a hazard whenever lava flows are less than 2 to 5 million years old. Should renewed volcanic activity occur, the pipeline could be destroyed where it physically




SOURCE: USGS OPEN-FILE REPORT 76-416

FIGURE 3-2. HORIZONTAL ACCELERATIONS IN BEDROCK (PERCENT G) WITH 90-PERCENT PROBABILITY OF NOT BEING EXCEEDED IN 50 YEARS

encountered lava or where it was overheated by proximity to lava or related volcanic effects. Although data to determine the potential for such activity are not available, the likelihood for occurrence appears to be slight.

Much of the proposed project and alternatives could be subject to dense ash falls similar to those which occurred following the recent eruptions of Mount St. Helens in Washington. However, such ash falls would not be likely to cause significant operational problems at compressor stations.

Landslide potential has been assessed according to the presence of existing landslides or the regional landslide potential. No attempt was made to identify individual slides or to determine whether construction activities in specific areas could cause landslides. Potential mitigation techniques other than rerouting the pipeline include slope stabilization measures which may not be practical for the pipeline project.

The subsidence to which this project could be subjected includes that related to ground water withdrawal, earthquakes, and surface loading by reservoirs. None of these types of subsidence are likely to be localized enough or occur swiftly enough to significantly affect the proposed project. Therefore, subsidence will not be specifically discussed in the description of each alternative.

Topographic modification resulting from pipeline projects is usually not permanent or significant; consequently, an exhaustive description of the topography in the project area is unnecessary. However, there are areas such as canyons where the topography is so rugged or space so limited that permanent topographic scars may result from construction. The most significant of these areas will be identified.

## GEOLOGY

Along the proposed route, the expected maximum earthquake bedrock accelerations would be distributed as follows:

| | |
|---|---|
| Less than 0.04 g | 160 miles |
| 0.04-0.10 g | 150 miles |
| 0.10-0.20 g | 250 miles |
| Greater than 0.20 g | 50 miles |

The final category includes no areas greater than 0.21 g.

The proposed Sage Compressor Station and maintenance base and the Heber City maintenance base could be subjected to 10 to 20 percent g, the Nephi maintenance base to 20 percent g, and the Cedar City and Las Vegas maintenance bases to 4 to 10 percent g.

Several known active faults along the RMPP can be expected to move in the future. These include the Wasatch fault (MP 195), the Elsinore fault (MP 231), and the Hurricane fault (MP 293). The crossings of these faults would occur approximately in the center of a zone where faulting may be expected. In addition to these specific crossings, the proposed pipeline would parallel these and related faults in several areas where faulting could occur. In all, about 11 miles of the proposed pipeline could be affected by fault rupture.

A potential for active faulting exists near Nephi and Cedar City. The maintenance bases proposed near these towns would have to be located or designed to avoid or accommodate such faulting.

The applicant has identified a high likelihood of liquefaction along 90 miles of the proposed route where 15 percent g in conjunction with high ground water is expected:

MP 147 - MP 177

MP 185 - MP 195

MP 212 - MP 213

MP 214 - MP 233

MP 235 - MP 265

The sites for the Nephi and Cedar City maintenance bases have yet to be chosen. However, the potential for liquefaction is so widespread in these areas that judicious siting of the bases alone would probably not avoid the problem. The Heber City maintenance base might also face liquefaction problems.

The proposed pipeline would pass through two areas where volcanic activity, including lava flows, has occurred during the past 2 million years. These areas occur in Millard County, Utah, between MP 250 and MP 265, where flows more recent than 10,000 years ago have been dated, and in Washington County, Utah, between MP 370 and MP 405.

In addition to this problem, the southern 270 miles of the route could be subject to dense volcanic ash falls.

Approximately 50 miles of the proposed route are subject to landslide hazard, primarily between MP 145 and MP 195. Landslides already occur along valley walls in this interval; the potential for earthquake ground motion contributes to the potential for future landsliding.

### TOPOGRAPHY

The proposed project would lie within two physiographic provinces of western North America--the Middle Rocky Mountains and the Basin and Range. The boundary between the two occurs at the Wasatch Front in Utah near MP 195. The Middle Rocky Mountains province consists of mountain ranges, plateaus, and intermontane basins. The proposed route would cross the westernmost range of this province as well as the highest range of mountains in the project area--the Wasatch Range. North-south trending mountain ranges with intervening basins of similar orientation mark the Basin and Range province.

Difficult terrain would be encountered in the Wasatch Range in the intervals between MP 75-MP 100, MP 150-MP 170, and MP 175-MP 195. Rough topography would also be encountered in the Mineral Mountains, MP 290 to MP 294, and the mountains north of St. George, Utah, MP 365 to MP 406.

## Water Resources

According to the National Topographic Maps 1:250,000-scale series, the proposed action would cross 32 intermittent streams and 29 perennial streams. Table 3-17 summarizes the potential stream crossings by flow class. A complete list of the crossings by county, state, and milepost are included in appendix A of the *Water Resources Technical Report* (BLM 1981h).

The proposed pipeline system would cross a floodplain at each stream crossing. The floodplains would vary in width from a few feet on either side of the stream to several thousand feet. All of the aboveground, permanent structures for the proposed action have been generally located, and none would be constructed within these floodplains.

TABLE 3-17

SUMMARY OF STREAM CROSSING DATA[1]

| | Total Stream Crossings | Intermittent | Perennial | FWS Stream Classification System[2] | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | I | II | III | IV | UC |
| Proposed Action | 61 | 32 | 29 | 3 | 9 | 5 | 2 | 42 |
| Alternative A, Northern Systems Alternative (Best Case) | 10 | 18 | 18 | - | - | 5 | 1 | 30 |
| (Worst Case) | 36 | 3 | 7 | - | - | 4 | - | 6 |
| Alternative B, Sanpete Valley Alternative | 85 | 41 | 44 | 3 | 8 | 11 | 4 | 59 |
| Alternative C, Central Nevada Alternative | 88 | 44 | 44 | 2 | 11 | 5 | 4 | 66 |
| Alternative D, Sevier-Escalante Desert Alternative | 64 | 29 | 35 | 3 | 9 | 5 | 4 | 43 |
| Alternative E, West Salt Lake Alternative | 41 | 20 | 21 | 1 | 1 | 4 | 5 | 34 |
| Alternative F, Provo Canyon Alternative | 53 | 28 | 25 | 3 | 2 | 5 | 1 | 42 |
| Variation 2, Thistle Creek Variation | 7 | 2 | 5 | - | - | 2 | 1 | 4 |
| Variation 3, East Las Vegas Variation | 2 | 2 | 0 | - | - | - | - | 2 |
| Variation 4, Fort Mojave Variation | 1 | 1 | 0 | - | - | - | - | 1 |
| Variation 5,-Mill Creek Variation | 1 | 1 | 0 | - | 1 | - | - | - |
| Variation 6,-Daniels Canyon Variation | 7 | 2 | 5 | 1 | 3 | 1 | - | 3 |

[1]The FWS does not have a stream classification system for California. Further research has shown that the California Department of Fish & Game also lacks a stream classification system. Therefore, streams in California were not classified for fisheries (Delisle 1980).

[2]FWS Classes: I=Highest value; II=High priority; III=Substantial; IV=Limited; UC=Unsurveyed or no fishery resource.

## Noise Quality

The proposed pipeline would pass through generally rural areas of low population density, although some residential, commercial, and industrial development does occur along the proposed route. The ambient noise levels in rural areas along the proposed right-of-way typically range from 35 to 50 dB(A).

RMPC has not surveyed noise levels near the Sage Compressor Station. Existing sources of noise in the vicinity include Highway 89, about 5 miles south of the proposed site. A Union Pacific Railroad is located about 4 miles to the east. There is also a county road within 0.25 mile of the proposed compressor station. The nearest noise receptor is a ranch house about 3,950 feet to the southeast.

Sound levels are represented as an $L_{eq}$, sound energy averaged over a 24-hour period, or an $L_{dn}$, the $L_{eq}$, with a 10- dB(A) weighting applied to nighttime sound levels (10 p.m. to 7 a.m.). The $L_{eq}$ is an equivalent A-weighted sound level, while the $L_{dn}$ is a day-night sound level. The estimated ambient sound levels for the proposed Sage Compressor Station site are an $L_{eq}$ of 43 dB(A) and an $L_{dn}$ of 49.4 dB(A). The estimated ambient sound levels at the nearby house are an $L_{eq}$ of 45 dB(A) and an $L_{dn}$ of 51.4 dB(A). The higher $L_{eq}$ value at the house is the result of noise generated by ranching activities.

For the remainder of the proposed route, the following estimates of typical background noise levels based on population density may be used (National Research Council 1977).

| Location | Persons Per Square Mile | $L_{dn}$(dB) |
|---|---|---|
| Rural--Undeveloped | 20 | 35 |
| Rural--Partially Developed | 60 | 40 |
| Quiet Suburban | 200 | 45 |
| Normal Suburban | 600 | 50 |
| Urban | 2,000 | 55 |
| Noisy Urban | 6,000 | 60 |
| Very Noisy Urban | 20,000 | 65 |

The alternatives and variations to which this discussion also applies are identified in figure 3-1.

## Air Quality

The RMPP would be located in the following air quality control regions (AQCR's):

| | |
|---|---|
| California | South Coast Air Quality Management District |
| Nevada | Clark-Mojave-Yuma Interstate Air Quality Control Region (AQCR 13) |
| | Nevada Interstate Air Quality Control Region (AQCR 147) |
| Utah | Four Corners Intrastate (EPA 014) |
| | Utah Intrastate (219) |
| | Wasatch Front (220) |
| Wyoming | Wyoming Intrastate (AQCR 243) |

The national primary and secondary standards for air pollutants are presented in table 3-18. The primary standards are levels necessary to protect public health; secondary standards, generally more stringent than primary standards, are designed to protect public welfare from any known or anticipated adverse effect of gaseous aerosol pollutants. The ambient air quality standards for Wyoming, Utah, Nevada, and California are also included in table 3-18.

The ambient air quality along the proposed right-of-way is quite good, largely typical of the sparsely populated nonindustrial areas of the Southwest. However, a few counties along the proposed right-of-way presently violate the NAAQS for total suspended particulates (TSP) and CO. Table 3-19 lists

the attainment status of each county to be crossed by the proposed pipeline.

Presently, Utah County, Utah, violates the primary standards for TSP and photochemical oxidants, while a portion of Iron County, Utah, violates the primary standard for sulfur dioxide ($SO_2$). The Las Vegas Valley, within Clark County, Nevada, violates the primary standard for CO, TSP, and photochemical oxidants. San Bernardino County, California, is in nonattainment status for TSP, CO, $NO_x$, and photochemical oxidants. The attainment status for the remainder of the counties either cannot be classified, is better than national standards, or does not differentiate between the two.

The applicant proposes to install 31,800 hp. of compression at the Sage Compressor Station in Lincoln County, Wyoming. In the future, RMPC may construct three additional 10,600-hp. compressor stations (booster stations) in Summit, Millard, and Iron Counties, Utah. The applicant may also install an additional 21,200 hp. of compression at the Sage Compressor Station in 1985. Table 3-20 lists the approximate maximum ambient air background levels of pollutants at these sites.

TABLE 3-18

NATIONAL AND STATE AIR QUALITY STANDARDS (Concentrations in ug per cubic meter unless otherwise noted)

| Pollutant | [a]National Primary Standards | [a]National Secondary Standards | [a]Wyoming | Utah | [b]Nevada | California |
|---|---|---|---|---|---|---|
| Total Suspended Particulates | | | | | | |
| Annual Geometric Mean | 75 | 60 | 60 | 75 | 75 | 60 |
| 24-Hour Maximum | 260 | 150 | 150 | 260 | 150 | 100 |
| Sulfur Dioxide | | | | | | |
| Annual Arithmetic Mean | 80 | - | 60 | 80 | 80 | No annual standard 132/1 hour-1300 |
| 24-Hour Maximum | 365 | - | 260 | 365 | 365 | |
| 3-Hour Maximum | [c]365 | 1,300 | 1,300 | - | 1,300 | |
| Carbon Monoxide | | | | | | |
| 8-Hour Maximum | 10 mg/cubic meter | 10 mg/cubic meter | 10 mg/cubic meter | 10 mg/cubic meter | 10 mg/cubic meter | --- |
| 1-Hour Maximum | 40 mg/cubic meter | 40 mg/cubic meter | 40 mg/cubic meter | 40 mg/cubic meter | 40 mg/cubic meter | 40 mg/cubic meter |
| Nitrogen Dioxide | | | | | | |
| Annual Arithmetic Mean | 100 | 100 | [d]100 | 100 | 100 | No annual standard 1 hour-474 |
| Ozone | | | | | | |
| 1-Hour Maximum | 235 | 235 | 235 | 235 | 235 | 198 |
| Hydrocarbons (Nonmethane) ($R\text{-}CH_3$) | | | | | | |
| 3-Hour (6 tof 9 a.m.) | 160 | 160 | 160 | 160 | 160 | --- |
| Hydrogen Sulfide | | | | | | |
| 0.5 Hour Average | - | - | [e]70 | - | - | 3 hour-42 |
| 0.5 Hour Average | - | - | [f]406 | - | - | |

[a]All national standards, except those based on annual averages or annual geometric mean, are not to be exceeded more than once a year.

[b]Source: Nevada Division of Environmental Protection 1978.

[c]No standard exists.

[d]Emissions of $NO_x$ from gas-fired fuel burning equipment shall be limited to 0.216 per million Btu's of heat input. This does not apply to internal combustion engines with a heat input of less than 200 million Btu's per hour.

[e]Standard not to be exceeded more than two times per year.

[f]Standard not to be exceeded more than two times in any 5 consecutive days.

TABLE 3-19

AMBIENT AIR QUALITY ATTAINMENT STATUS ALONG THE PROPOSED RIGHT-OF-WAY

| County | State | Total Suspended Particulates | Sulfur Dioxide | Photochemical Oxidants | Carbon Monoxide | Nitrogen Dioxide |
|---|---|---|---|---|---|---|
| Lincoln | Wyoming | [a]B | B | C/B | [b]C/B | C/B |
| Rich | Utah | B | B | C/B | C/B | C/B |
| Summit | Utah | B | B | C/B | C/B | C/B |

TABLE 3-19—Continued

| County | State | Total Suspended Particulates | Sulfur Dioxide | Photochemical Oxidants | Carbon Monoxide | Nitrogen Dioxide |
|---|---|---|---|---|---|---|
| Wasatch | Utah | B | B | C/B | C/B | C/B |
| Utah | Utah | [c]P | B | P | C/B | C/B |
| Sanpete | Utah | B | B | C/B | C/B | C/B |
| Juab | Utah | B | B | C/B | C/B | C/B |
| Millard | Utah | B | B | C/B | C/B | C/B |
| Beaver | Utah | B | B | C/B | C/B | C/B |
| Iron | Utah | B | P | C/B | C/B | C/B |
| Washington | Utah | B | B | C/B | C/B | C/B |
| Lincoln | Nevada | C/B | C/B | C/B | C/B | C/B |
| Clark | Nevada | P | C/B | P | P | C/B |
| San Bernardino | California | P | B | [d]P | [d]P | [d]P |

[a]B--Better than national standards.

[b]C/B--Cannot be classified or better than national standards.

[c]P--Does not meet primary standards under NAAQS.

[d]Only a portion of each county does not meet the primary standards under the national ambient air quality standards.
SOURCE: EPA 1978.

TABLE 3-20

PREDICTED AMBIENT AIR QUALITY BACKGROUND LEVELS AT RMPP COMPRESSOR STATIONS (Values are ug/cubic meter)

| Pollutant | Averaging Time | Sage Compressor Station, Lincoln County, Wyoming | Booster Station, Summit County, Utah | Booster Station, Millard County, Utah | Booster Station, Iron County, Utah |
|---|---|---|---|---|---|
| Total Suspended Particulates | Annual | - | - | - | - |
| | 24-hour | 12 | 12 | 12 | 12 |
| | 1-hour | 30 | 30 | 30 | 30 |
| Sulfur Dioxide | | - | - | - | - |
| | 24-hour | 8 | 8 | 8 | 8 |
| | 3-hour | 18 | 18 | 18 | 18 |
| | 1-hour | 20 | 20 | 20 | 20 |
| Carbon Monoxide | Annual | - | - | - | - |
| | 8-hour | [a]809 | 809 | 809 | 809 |
| | 1-hour | 1,156 | 1,156 | 1,156 | 1,156 |
| Nitrogen Dioxide | Annual | 20 | 20 | 20 | 20 |

[a]809 ug per cubic meter = 0.809 mg per cubic meter.
SOURCE: EPA 1977.

Class I areas have been defined by the EPA as:

a) International parks.

b) National wilderness areas which exceed 5,000 acres.

c) National memorial parks which exceed 5,000 acres.

d) National parks which exceed 6,000 acres and which were in existence on August 7, 1977. These areas are given more protection under the Clean Air Act--i.e., the incremental emission allowances are more restrictive for new sources.

The Class I area closest to the Sage Compressor Station would be the combined Yellowstone and Grand Teton National Parks, located about 140 miles northwest of the proposed site. Arches National Park, a Class I area, would be 150 miles southeast of the booster station in Summit County, Utah. Canyonland National Park and Capitol Reef National Park would be located 133 and 66 miles, respectively, to the southeast of the booster station in Millard County, Utah. The third booster station would be located 58 miles west of Bryce Canyon National Park and 35 miles northwest of Zion National Park in Iron County, Utah. Zion National Park would be the Class I area closest to the RMPP in Utah; the San Bernardino National Forest (San Bernardino County, California), 140 miles southwest of Needles, would be the Class I area closest to the RMPP in California.

The alternatives and variations to which this discussion also applies are identified in figure 3-1.

## ALTERNATIVE A--NORTHERN SYSTEMS ALTERNATIVE

### Vegetation

The worst case of the Northern Systems Alternative would traverse or locate permanent installations upon 10 miles of mountain brush vegetation,

41 miles of sagebrush, 28 miles of creosote brush, and 58 miles of Mediterranean annual grass. The best case for the alternative would traverse 10 miles of mountain brush, 41 miles of sagebrush, and 26 miles of creosote bush. Joshua trees and cactus species are scattered throughout the creosote bush vegetation type. Each vegetation type is described in detail in the *Terrestial and Aquatic Biology Technical Report* (BLM 1981d). General locations of vegetation types adopted from Kuchler (1975) can be found on map S-24 of the *Graphic Supplement*; miles are summarized on table 3-1.

The lands are used largely for livestock grazing, wildlife habitat, recreation, and watershed.

## Wildlife

Best- and worst-case possibilities for this alternative are the same for all species except where noted. Habitats are identical for the first 167 miles, the west end to the Pocatello Loop.

### BEST CASE

#### Mammals

Critical deer winter ranges would be traversed by the Northern Systems Alternative for about 10 miles in Wyoming from the Kemmerer Compressor Station along Twin Creek to Boulder Ridge, (MP 0 to MP 10). Another deer winter area would then be crossed in Utah from about Rabbit Creek, north along the alternative for about 5 miles to Lake Ridge (MP 15 to MP 20). Construction along approximately 7 miles of the Pegram Loop (MP 33 to MP 40) would cross critical deer winter range, and a 5-mile long portion of the Soda Springs Loop extending from the compressor station to about Diamond Gulch (MP 66 to MP 71) which would parallel and lie within 1 mile of deer winter range.

Moose occasionally winter in the Twin Creek area in Wyoming (MP 0 to MP 10) and on North Eden Creek in Utah (MP 23). The alternative would not traverse any known moose ranges in Idaho.

The only known American elk winter ranges that would be encountered by this alternative are located in Wyoming on a 10-mile long strip along Twin Creek west of Kemmerer (MP 0 to MP 10).

#### Birds

Sage grouse would not be abundant anywhere along this alternative. Although proper sagebrush habitat exists, only small populations are found in Wyoming for about 8 miles west of the Kemmerer Compressor Station (MP 0 to MP 8). A wintering area would be traversed in Utah near the vicinity of Rabbit Creek (MP 15 to MP 18), and a strutting ground might be encountered near South Lake (MP 19). In Idaho, small populations of this bird would be found in the vicinity of the Pegram Compressor Station (MP 33 to MP 36).

The gray partridge is found in some of the drier agricultural areas west of Pocatello, Idaho, but populations would be small and scattered in the vicinity of this alternative.

Sharp-tailed grouse are also found in much the same habitat as the gray partridge, but in even smaller numbers along this alternative west of Pocatello. Ring-necked pheasants could be found on about 43 miles of croplands (521 acres) along this alternative.

The Northern Systems Alternative would encounter waterfowl habitat in the vicinity of South Lake in Utah, along the Bear River in both Utah and Idaho, and through the Soda Point Reservoir area. Other wet habitats could be encountered in scattered areas from the Pocatello Compressor Station west to the vicinity of Cold Water. This waterfowl habitat totals an estimated 41 miles (497 acres) for the best case. Refer to table 3-6 for the locations of these areas.

Both nesting and hunting habitat for raptors is found along Twin Creek in Wyoming where both prairie falcons and ferruginous hawks, as well as marsh hawks, have been reported to be nesting. The alternative in Utah would go through Swainson's red-tailed and marsh hawk habitat. In the vicinity of the Pegram Loop, habitat for ferruginous, marsh, red-tailed and Swainson's hawks would be traversed, while these same species would be found along the alternative from the Soda Springs Compressor Station to Soda Point. The same species might be encountered in a 25-mile long portion of the alternative west of the Pocatello Compressor Station.

While golden eagles are seen occasionally in areas near this alternative, no nests are known to occur within 1 mile of the route.

#### Reptiles and Amphibians

Reptile and amphibian habitat would be traversed by this alternative in Wyoming, Utah, and Idaho, but populations are scattered and are not expected to be affected by a linear project such as this.

## WORST CASE

### Mammals

Species and habitats that could be affected by the worst case of this alternative would be the some as those affected by the best case of the alternative, because these species do not occur in the portion of California that would be traversed by this alternative.

### Birds

Waterfowl habitat would be encountered by this route in the vicinity of South Lake in Utah, along the Bear River in both Utah and Idaho through the Soda Point Reservoir area. Other wet habitats could be encountered in scattered areas from the Pocatello compressor station, west to the vicinity of Cold Water.

The Sacramento-San Joaquin Delta that would be traversed by the alternative in California, supports an estimated 10 percent of the wintering waterfowl in the Central Valley. Portions of this area which would be crossed by the route are located between MP 0 and MP 16 in portions of Contra Costa and Alameda Counties.

With the exception of waterfowl and the golden eagle, bird species found along this alternative would be the same as these for the best case, since most of them are not found along the California portion of this alternative. While the golden eagle is occasionally seen on or near this area, no nests are known to occur within 1 mile of this alternative in California.

### Reptiles and Amphibians

Reptile and amphibian species and habitats in Wyoming, Utah, and Idaho would remain the same as those for the best-case alternative. However, under the worst-case scenario, the route would cross Kellogg Creek (MP 5) in Contra Costa County, California, an area utilized by both the California tiger salamander and the red-legged frog. These two species are of special concern to the California Department of Fish and Game. As studied, the alternative would also pass near the Coral Hollow Ecological Reserve in San Joaquin County, in California (MP 22), which furnishes additional habitat for the red-legged frog.

### Federal Listed Species

The black-footed ferret could occur along portions of this alternative in Wyoming and Utah wherever prairie dog colonies are found in historical ferret range. Field surveys would be required to determine the presence or absence of prairie dog colonies along this alternative and presence or absence of black-footed ferrets in any prairie dog colony crossed by the alternative.

The San Joaquin kit fox is found along this alternative from about MP 70 to the end of the pipeline near Panoche Junction. Field surveys would be required to determine the locations of dens and other important habitats.

The blunt-nosed leopard lizard could be encountered by this alternative in Fresno and Merced Counties in California from about MP 60 to the end of the route near Panoche Junction. Field surveys would be required to determine the presence or absence of these lizards along the pipeline right-of-way.

The desert tortoise is not federally listed as either threatened or endangered in California.

## Soils

The following soil groups would be most strongly affected by the best case version of the Northern Systems Alternative: 3 miles of Soil Group 1, 26 miles of Soil Group 4, 7 miles of Soil Group 5, 13 miles of Soil Group 6, 2 miles of Soil Group 8, and 12 miles of Soil Group 9.

The worst-case Northern Systems Alternative would most strongly affect the following soil groups: 3 miles of Soil Group 1, 26 miles of Soil Group 4, 10 miles of Soil Group 5, 49 miles of Soil Group 6, 2 miles of Soil Group 8, and 41 miles of Soil Group 9. Refer to the discussion of the proposed action and table 3-9 for additional soil information.

## Visual Resources

The Northern Systems Alternative would traverse the landscapes of the Middle Rocky Mountains and Basin and Range physiographic provinces. The worst case would also cross the Pacific Border physiographic province. For the best case, landforms vary from the flat to transitional slopes of western Wyoming and southeastern Idaho to the flat to gently rolling areas of the San Joaquin Valley of

central California; for the worst case, they would also include the hot flat desert landscape of southern California. Vegetation along the best- case alternative includes diverse areas of sagebrush, mountain brush, pockets of aspen and conifer, and agriculturalized areas in Wyoming and Idaho. In addition, the worst-case area includes the vineyards, orchards, croplands, and natural grasses in central California and the typical hot desert sparse creosote bush and occasional Joshua trees and cactus of the Mojave Desert. Cultural modifications in the area include ranching and agricultural activities, urbanized areas and small communities, highways, recreation areas, and historical features.

The visual resources along the pipeline right-of-way of the alternative route would not be significantly adversely affected.

An analysis of the ancillary facilities includes only the Stanfield Compressor Station as specifically described in table 3-21. (See table 3-11 for a summary of the total number of miles and acres for each VRM Class which would be crossed by the alternative.)

TABLE 3-21

AFFECTED ENVIRONMENT FOR VISUAL RESOURCES: NORTHERN SYSTEMS ALTERNATIVE

| MP[1] | VRM Class[2] | Description |
|---|---|---|
| **Ancillary Facilities** | | |
| Stanfield, Oregon Vicinity | 4 | Stanfield Compressor Station. Landform consists of a flat to gently rolling landscape. Vegetation consists of cropland species, with occasional interspersed fence line, vegetation, and woodlots. Cultural modifications include occasional rural residences along rural roads with occasional rural structures, two underground pipelines, irrigation canals, primitive roads, and overhead utility lines. |

[1]Only those segments and facilities which would be significantly affected by the Northern Systems Alternative area described.
[2]Refer to table 3-10 for definitions of terms.

## Land Uses: Agriculture

The best-case Northern Systems Alternative would traverse 43 miles of cropland. Table 3-12 indicates the total acreages and mileages of cropland which would be affected by the Northern Systems Alternative. The larger part of the cropland would be irrigated, mainly surface irrigation with some areas of sprinkler irrigation. The main crops grown are corn, alfalfa, hay, irrigated pasture, and small grains.

The worst-case alternative would traverse 88 miles of cropland; the larger portion of this cropland would be irrigated.

The main crops grown in the California area include corn, cotton, small grain, vegetables, fruit and nut trees, and grapes. Two areas of orchards and vineyards which would be close to the Brentwood-Panoche Junction segment are located near MP 31 and MP 93.

## Socioeconomics

All of the counties that would be affected by construction of this alternative in Wyoming, Utah, Idaho, and Oregon are rural, with population densities ranging from 2.1 to 54.5 per square mile. The economy of the area that would be crossed by the pipeline loops in Idaho is orientated toward agriculture, especially beef and dairy farming. The recreation industry is also prominent because of the Caribou National Forest, which comprises a large percentage of southeastern Idaho. Pocatello, the only major municipality near the loops in Idaho, has a large tourist service industry.

The 120-mile long pipeline in California would parallel Interstate 5 through the San Joaquin Valley, a region famous for its highly productive and diversified agriculture. Numerous communities along or near Interstate 5 have traveler services. Four of the counties which would be crossed by this pipeline are urban, with population densities ranging from 175.8 to 1,497.4 people per square mile. However, within 1 mile of the route, population density is low. The 28-mile long pipeline segment along Interstate 15 between Victorville and Barstow, California, is located in the Mojave Desert. Interstate 15 is a major artery between Los Angeles and Las Vegas, and these two towns have a large hotel/motel and traveler services industry. Table 3-22 lists the pertinent socioeconomic characteristics of the regions which would be affected by the pipeline construction; table 3-23 identifies the socioeconomic char-

acteristics of the regions which would be affected by construction of the compressor station.

All of the compressor sites are located in remote agricultural areas. Nevertheless, only one, the Delevan Compressor Station, is located more than 60 miles from a large town. Sacramento, California, is about 70 road miles from this compressor station.

To construct this alternative, the applicant would probably use double- jointing yards to weld sections of pipe before delivering them to the right- of-way. Hypothetical locations of these yards are listed in table 2-1. These locations are presented merely for illustration and may in fact not be feasible because of engineering or logistical considerations; therefore, the socioeconomic characteristics of the sites are not considered in this analysis. New maintenance bases would not be needed because existing ones could be used.

TABLE 3-22

SOCIOECONOMIC PROFILE: NORTHERN SYSTEMS ALTERNATIVE

| Construction | MP | Region | | Estimated Population, 1980 | Averages Employment 1979 | Average Unemployment, 1979 | Personal Income, 1977 ($1,000) | Retail Sales, 1977 ($1,000) | Hotel and Motel Rooms | Campsites with Hookups |
|---|---|---|---|---|---|---|---|---|---|---|
| | | State | Counties | | | | | | | |
| Pipeline Spread 1 (Northwest Pipeline Looping) | 0-21.7 | Wyoming | Lincoln | | | | | | | |
| | 33.17-40.2 | Utah | Rich | | | | | | | |
| | 66.37-89.2 | Idaho | Bear Lake, Caribou | 101,952 | 42,734 | 2,193 | 495,910 | 332,016 | 1,310 | 291 |
| | 144.91-170.2 | | Bannock, Power | | | | | | | |
| Pipeline Spread 2 | | | | | | | | | | |
| PG&E Looping | 0-120.0 | California | [a]/Contra Costa, | | | | | | | |
| PG&E Tie-in to SoCal | 0-28.3 | | Alameda, San Joaquin, Stanislaus, Merced, San Benito, Madera, Fresno, San Bernardino. | 3,036,800 | 1,415,109 | 109,857 | 18,806,660 | 14,688,431 | 6,749 | 1,523 |

[a]/Because San Bernardino County is very large and would have only 28.5 miles of pipeline construction, housing data only for the communities closet to the pipeline are included. County population, employment, income, and retail sales are excluded.

SOURCE: Appendix C, tables C-1, C-2, C-3, C-4, and C-5.

TABLE 3-23

NORTHERN SYSTEMS ALTERNATIVE SOCIOECONOMIC PROFILE: COMPRESSOR CONSTRUCTION

| Compressor Station | Location | | | [b]1977 Population | [a]1979 Employment | | [b]1977 Total Personal Income ($1,000) | [b]1977 Total Retail Sales ($1,000) | [b]Housing | |
|---|---|---|---|---|---|---|---|---|---|---|
| | State | County | [c]Nearest Towns | | Total Employed | Total Unemployed | | | Hotel/ Motel Rooms | Private Campgrounds with Services |
| [d]Stanfield | Oregon | Umatilla | Stanfield | | | | | | | |
| | | | Hermiston | 23,133 | 24,673 | 1,857 | 131,640 | 145,781 | 665 | 41 |
| | | | Pendleton | | | | | | | |
| [e]Ione | Oregon | Morrow | Hermiston | | | | | | | |
| | | Umatilla | Pendleton | 23,593 | 30,623 | 2,157 | 137,890 | 145,781 | 666 | 41 |
| | | | Heppner.. | | | | | | | |
| [e]Madras | Oregon | Jefferson | [f]Prineville | 5,918 | 5,019 | 551 | 30,549 | 27,198 | 54 | 91 |
| [e]Bonanza | Oregon | Klamath | Klamath Falls | 17,102 | 23,287 | 2,303 | 105,399 | 163,533 | 737 | 106 |
| [e]Delevan | California | Colusa | Colusa | | | | | | | |
| | | Colusa | Williams | 10,488 | 16,458 | 1,367 | 61,016 | 58,049 | 23 | 141 |
| | | Glenn | Willows | | | | | | | |

[a]Figures are for the counties listed.

[b]Figures include only the towns listed.

[c]Nearest towns with hotel/motel rooms.

[d]This would be a new compressor station.

[e]This is an existing station which would require additional horsepower.

[f]Prineville is located in Crook County, Oregon.

SOURCES: Appendix C, tables C-2, C-3, C-4, and C-5.

## Cultural Resources

The best-case Northern Systems Alternative would traverse major streams, the Bear River, and the Snake River Valley. These areas have high site density. In Idaho, site density is projected as moderate to high. Surveys of river valleys in east-central Idaho indicated the presence of numerous base camps including caves and rockshelters. Seasonal use camps have been the predominant site type recorded. In higher elevations (near MP 70), site density is projected as low to moderate. Previous research indicates an Archaic through Shoshonean occupation in the area.

The worst case of the Northern Systems Alternative would traverse all of the previously identified areas plus the Mojave River. In the San Joaquin area (MP 0 to MP 120), site types would probably consist of acorn processing stations, hunting camps, and butchering camps. The San Luis Gonzaga Archaeological District (near MP 40) is on the National Register of Historic Places.

## Geology and Topography

### GEOLOGY

Along the Northwest looping, about 25 miles would be subject to an expected ground motion of less than 0.04 g, 6 miles subject to between 0.04 and 0.1 g, and 46 miles subject to between 0.1 and 0.2 g. There is a potential for fault rupture at MP 3 and near MP 66 and MP 75, and there may be a potential for liquefaction between MP 73 and MP 82.

None of the loops would cross areas with significant landslide potential, nor would significant volcanic ash fall be likely. However, there would be a lava flow hazard between MP 68 and MP 89, where the alternative would cross the southern end of the Blackfoot Lava Field, and on the entire Pocatello Loop. While the latter would not cross old flows, there are extensive flows north of the Snake River adjacent to the whole loop.

The Stanfield Compressor Station at MP 585.8, subject to ground motion of just under 0.1 g, would be in UBC Zone 2. There is a potential for dense ash falls at this location--about 140 miles east-southeast of Mount St. Helens, Washington--but no significant volcanic hazard, fault, liquefaction, or landslide hazard is present.

No significant geologic hazards are present at two of the four compressor stations (Ione and Madras) where additional compression would be required on the PGT and PG&E systems, although both would be subject to ash fall. None of the stations would be subject to landslide hazard; all but Delevan would be subject to an expected ground motion of less than 0.04 g.

The Delevan Compressor Station, would be subject to an expected ground motion of about 0.16 g and, depending on the ground water conditions, could be subject to liquefaction. No volcanic hazards other than ash fall would be present.

In addition to potential ash fall, the Bonanza Compressor Station, could experience lava flows. It is located near the perimeter of an area which has experienced flows in the geologically recent past.

In California, two segments of pipeline might be required: 120 miles between Brentwood and Panoche Junction and 28.3 miles of looping between Hinkley and Adelanto. Twenty-three miles of the Brentwood-Panoche Junction pipeline could experience ground motion between 0.1 and 0.2 g. Along the remaining 97 miles, ground motion could range from 0.2 to 0.3 g. All of the Hinkley-Adelanto loop would be less than, but near, 0.2 g. Fault hazard would be present where the 120-mile long pipeline crossed the Black Butte fault (MP 20) and where the Hinkley-Adelanto loop crossed the Lockhart and Helendale faults, MP 1 and MP 15, respectively.

Liquefaction potential would be high for both segments wherever high ground water tables exist. For the Hinkley-Adelanto loop, there would be a potential for liquefaction near the Mojave River crossing, MP 4 to MP 7. No specific areas of significant liquefaction potential have been identified for the Brentwood-Panoche Junction pipeline; areas of concern lie between MP 0 and MP 20, MP 65 and MP 80, and MP 107 and MP 120.

No volcanic hazard, other than ash falls, exists along either pipeline. No significant landslides occur along either; however, minor landslides, which have occurred near the existing Brentwood-Panoche Junction pipeline between MP 35 and MP 40, could occur between MP 85 and MP 95.

### TOPOGRAPHY

Except for about 1 mile on the Pegram Loop, this alternative would encounter no difficult terrain.

## Water Resources

The best-case version of the Northern Systems Alternative would cross three intermittent streams and seven perennial streams. In a worst case situation, the alternative would cross 18 intermittent streams and 18 perennial streams.

## Noise Quality

The existing pipeline systems of Northwest, PGT, and PG&E pass through rural areas of low population density, although some residential, commercial, and industrial development does occur there. The ambient or background noise levels in suburban residential areas range from 48 to 52 dB(A).

Since the location of the Stanfield Compressor Station is not known, the ambient noise levels cannot be established. There are 9 existing compressor stations on Northwest's pipeline system between Kemmerer, Wyoming, and Stanfield, Oregon, and 10 existing compressor stations between Stanfield and PG&E's Delevan Compressor Station in Colusa County, California. These compressor stations are 50 to 60 miles apart. The location of the compressor stations that would be expanded, the horsepower to be installed, and the type of units are listed in table 3-24.

High speed gas-turbine engines, which provide power for compression, are responsible for much of the noise at these stations. Other minor noise contributors located outside compressor buildings include oil cooling fans (where present) and aboveground piping. Also, when a compressor is starting or stopping, high pressure gas is vented to the atmosphere for 5 minutes or less, causing additional noise. The peak noise level generated during venting would not exceed 100 dB(A). Such noise occurs infrequently and briefly; therefore, no significant impact upon the existing noise environment occurs.

While units are operating, noise levels at compressor stations generally range between 45 and 50 dB(A). No background noise levels for the existing compressor stations or the Northwest, PGT, and PG&E pipeline systems are known.

TABLE 3-24

MODIFIED COMPRESSOR STATIONS FOR NORTHERN SYSTEMS ALTERNATIVE

| [a]Compressor Station | Number of Units | Type of Units | Total Horsepower | MP | Nearest Dwelling (Miles) | Acoustically Treated Station | Intake and Exhaust Silencers | Venting Silencers | Sound Insulation (Aboveground piping) |
|---|---|---|---|---|---|---|---|---|---|
| Ione | 2 | Turbines..... | 41,232 | 319.5 | 1.14 | No..... | No..... | No..... | No |
| Madras | 2 | Turbines..... | 29,240 | 425.1 | 3.13 | No..... | No..... | No..... | No |
| Bonanza | 2 | Turbines..... | 34,624 | 559.2 | 0.42 | No..... | Yes..... | Yes..... | No |
| Delevan | 2 | Turbines..... | 32,950 | 810.4 | 0.66 | No..... | Yes..... | No..... | No |

[a] Ione, Madras, and Bonanza Compressor Stations are on PGT's existing right-of-way in Oregon. The Delevan Compressor Station is on PG&E's existing right-of- way in California.
Source: PGT and PG&E 1974.

## Air Quality

The Northern Systems Alternative would be located in the following AQCR's:

| | |
|---|---|
| Wyoming | Wyoming Intrastate (AQCR 243) |
| Utah | Four Corners Intrastate (EPA 014) |
| Idaho | Idaho Intrastate |
| | Metropolitan Boise Intrastate |
| Oregon | Eastern Oregon Interstate |
| California | Sacramento Valley Air Basin |
| | Northeast Plateau Air Basin |

Among the Northern Systems Alternative facilities which would affect air quality would be the new 400-hp. compressor station which would be constructed at Stanfield, Oregon, during the first phase

of the alternative. If the Western Leg begins transporting RMPP gas as well as Alaskan gas, additional compression would be added to the system in Morrow, Jefferson, and Klamath Counties, Oregon, and in Colusa County, California. To transport 800,000 Mcfd of RMPP gas along with Alaskan gas, additional compression would be added in Cassia, Bancock, and Elmore Counties, Idaho, along the Northwest pipeline system; Umatilla, Morrow, Sherman, Jefferson, Deschutes, and Klamath Counties, Oregon, along the PGT pipeline system; and Modoc, Shasta, Tehama, and Colusa Counties, California, along PG&E's system.

The majority of the existing air quality along the alternative is generally quite good, typical of the nonindustrial areas of the Pacific Northwest. However, a few counties along the existing Northwest, PGT, and PG&E rights-of-way presently violate the NAAQS for TSP, sulfur oxides ($SO_x$), and photochemical oxidants.

The NAAQS and standards and for the states that would be affected by the Northern Systems Alternative, shown in table 3-25, can be compared to the ambient air quality in the counties where compressor modifications would take place along the Northwest, PGT, and PG&E pipeline systems. The attainment status of each county is identified in table 3-26. Presently Colusa, Shasta, and Tehama Counties, California, violate the secondary standard for TSP. The attainment status for the remainder of the counties either cannot be classified or is better than the national standards. A portion of Bancock County, Idaho, violates the primary standard for $SO_2$and TSP. Colusa, Modoc Shasta, and Tehama Counties, California, violate the primary standards for photochemical oxidants.

There are no ambient air quality data for the compressor station sites along the Northwest, PGT, and PG&E pipeline systems. However, ambient concentrations of 22 micrograms (ug) per cubic meter for $NO_x$ and an 8-hour average of 809 ug per cubic meter with a 1-hour maximum of 1,156 ug per cubic meter were used for the EIS analysis of CO. These volumes were calculated by assuming that all compressor stations would operate at the full horsepower of the largest compressor station along any of the existing rights- of-way (Delevan Compressor Station on the PGT system in Oregon). The resulting emissions were converted into ambient ground-level concentrations by using EPA's PTMAX computer program. This procedure overestimates the ground-level concentration at each site, representing a worst-case impact.

Along the PGT and PG&E systems, there are three Class I areas. The Class I area nearest the PGT system in Oregon is the Crater Lake National Park, located in Klamath County about 30 miles southwest of Compressor Station 13. In Shasta County, California, there are two Class I areas near the project-- Lassen National Park, 30 miles southwest of Gerber Compressor Station, and the Whiskeytown National Recreation Area, 25 miles to the west. The Sawtooth Wilderness Area would be about 50 miles to the northwest of the Mountain Home Compressor Station in Elmore County, Idaho.

TABLE 3-25

NATIONAL AND STATE AIR QUALITY STANDARDS: NORTHERN SYSTEMS ALTERNATIVE (Concentrations in ug/cubic meter unless otherwise noted)

| Pollutant | [a]National Primary Standards | [a]National Secondary Standards | [b]Idaho | [b]Oregon | California |
|---|---|---|---|---|---|
| Total Suspended Particulates | | | | | |
| Annual Geometric Mean | 75 | 60 | 60 | 60 | 60 |
| 24-Hour Maximum | 260 | 150 | 150 | 150 | 100 |
| Sulfur Dioxide | | | | | |
| Annual Arithmetic Mean | 80 | - | 80 | 80 | No annual standard 132/ 1 hour-1300. |
| 24-Hour Maximum | 365 | - | 365 | 365 | ..... |
| 3-Hour Maximum | c | 1,300 | 1,300 | 1,300 | ..... |
| Carbon Monoxide | | | | | |
| 8-Hour Maximum | 10 mg/cubic meter | 10 mg/cubic meter | 10 mg/cubic meter | 10 mg/cubic meter | --- |
| 1-Hour Maximum | 40 mg/cubic meter | 40 mg/cubic meter | 40 mg/cubic meter | 40 mg/cubic meter | 40 mg/cubic meter |
| Nitrogen Dioxide | | | | | |
| Annual Arithmetic Mean | 100 | 100 | [d]100 | 100 | No annual standard 1 hour-474 |
| Ozone | | | | | |
| 1-Hour Maximum | 235 | 235 | 235 | 235 | 198 |
| Hydrocarbons (Nonmethane) ($R\text{-}CH_3$) | | | | | |
| 3-Hour (6 to 9 a.m.) | 160 | 160 | 160 | 160 | --- |

TABLE 3-25—Continued

| Pollutant | [a]National Primary Standards | [a]National Secondary Standards | [b]Idaho | [b]Oregon | California |
|---|---|---|---|---|---|
| Hydrogen Sulfide | | | | | |
| 0.5 Hour Average | - | - | - | - | 3 hour-42 |
| 0.5 Hour Average | - | - | - | - | ..... |

[a]All national standards, except those based on annual averages or annual geometric mean, are not to be exceeded more than once a year.

[b]BLM 1980b.

[c]No standards exists.

[d]Emissions of $NO_x$ from gas-fired fuel burning equipment shall be limited to 0.216 per million Btu of heat input. This does not apply to internal combustion engines with a heat input of less than 200 million Btu per hour.

TABLE 3-26.

AMBIENT AIR QUALITY ATTAINMENT STATUS ALONG THE NORTHERN SYSTEMS ALTERNATIVE

| County | State | Total Suspended Particulates | Sulfur Dioxide | Photochemical Oxidants | Carbon Monoxide | Nitrogen Dioxide |
|---|---|---|---|---|---|---|
| Cassia | Idaho | B | B | C/B | C/B | C/B |
| Bancock | Idaho | [a]P | [a]P | [b]C/B | C/B | C/B |
| Elmore | Idaho | [c]B | B | C/B | C/B | C/B |
| Umatilla | Oregon | B | B | C/B | C/B | C/B |
| Morrow | Oregon | B | B | C/B | C/B | C/B |
| Sherman | Oregon | B | B | C/B | C/B | C/B |
| Jefferson | Oregon | B | B | C/B | C/B | C/B |
| Deschutes | Oregon | B | B | C/B | C/B | C/B |
| Klamath | Oregon | B | B | C/B | C/B | C/B |
| Modoc | California | B | B | [d]P | C/B | C/B |
| Shasta | California | [e]S | B | P | C/B | C/B |
| Tehama | California | S | B | P | C/B | C/B |
| Colusa | California | S | B | P | C/B | C/B |

[a]Only a portion of each county does not meet the primary standards under the NAAQS.

[b]C/B--Cannot be classified or better than national standards.

[c]B--Better than national standards.

[d]P--Does not meet primary standard under NAAQS.

[e]S--Does not meet the secondary standard under the NAAQS.

# ALTERNATIVE B--SANPETE VALLEY ALTERNATIVE

## Vegetation

The Sanpete Valley Alternative would traverse 27 miles of forest land, 69 miles of mountain brush, 45 miles of sagebrush, 191 miles of pinyon-juniper, and 181 miles of creosote bush type vegetation. Joshua trees and cactus species occur within the creosote bush type.

Miles of vegetation types that would be affected are summarized in table 3-1 and located on map S-24. These areas are largely used for livestock grazing, wildlife habitat, recreation and watersheds, and forest products.

Other species that are unique to the creosote bush and greasewood-saltbush vegetation types in the desert biome include Joshua trees and cactus species that are not protected under threatened and endangered species legislation. These are sought for landscaping and collection, and state and/or Federal permits authorizing their removal are required. Populations of these desert plants could be found in numerous locations along the alternative from the southern portion of Utah near St. George to Needles, California. Refer to map S-24 for location of the creosote bush and greasewood-saltbush type.

## Wildlife

This discussion concerns only the portion of this alternative which is not identical to the proposed route.

### MAMMALS

Deer winter ranges would be found on this alternative from about MP 75 to MP 154; this area encompasses most of the south and southeast facing slopes along the Sevier River where proper winter habitat exists.

### BIRDS

Waterfowl habitat would be found along this alternative in the vicinity of the Gunnison Reservoir (MP 39 to MP 44), and along the Sevier River from MP 59 to MP 74 and MP 88 to MP 96. Rocky Ford Reservoir at about MP 70 furnishes more waterfowl habitat in this area. From Beaver Creek to Cottonwood Creek (MP 103 to MP 110) along the Sevier River, there is another waterfowl habitat area. The last waterfowl habitat along the Sevier River is from MP 125 to MP 131 to Circleville Canyon.

Good raptor habitat occurs between MP 0 and MP 18 and between MP 129 and MP 132 along the Sevier River in Circleville Canyon.

### FEDERAL AND STATE LISTED SPECIES

Habitats of the federally listed black-footed ferret and bald eagle would be crossed by this alternative as described in the proposed action section. Habitat of the state listed and protected populations of the desert tortoise would also be crossed by this alternative as noted for the proposed action.

## Soils

The Sanpete Valley Alternative would most strongly affect the following soil groups: 114 miles of Soil Group 1, 21 miles of Soil Group 2, 34 miles of Soil Group 3, 5 miles of Soil Group 4, 47 miles of Soil Group 5, 17 miles of Soil Group 6, 14 miles of Soil Group 8, and 243 miles of Soil Group 9.

Refer to the discussion of the proposed action in this chapter and table 3-9 for additional soil information.

## Visual Resources

The Sanpete Valley Alternative portion which varies from the proposed action would lie entirely within the Colorado Plateaus physiographic province. Landforms vary from flat valley bottoms to the steeper mountainous areas which separate the valleys. Vegetation varies from sagebrush and agricultural plants on the lower areas to juniper and mountain brush at the higher elevations and greasewood and sagebrush along the southernmost portion. Cultural modifications include a number of small communities, ranches, highways, utilities, and a railroad along the alternative. The tabulation in table 3-27 describes those segments of the alternative which would experience significant visual impact. (See table 3-11 for a summary of the total number of miles and acres for each VRM Class which would be crossed by the alternative.)

TABLE 3-27

AFFECTED ENVIRONMENT FOR VISUAL RESOURCES: SANPETE VALLEY ALTERNATIVE

| MP | VRM Class [2] | Description |
|---|---|---|
| **Pipeline**[1] | | |
| MP 95-MP 105 | 2 | Landform consists of steep canyon slopes along the Sevier River. Mountain brush is the predominant vegetative species. Cultural modifications are generally limited to U.S. Highway 89 and a railroad. |

TABLE 3-27—Continued

| MP | VRM Class [2] | Description |
|---|---|---|
| MP 121-MP 124 | 4 | Landform is steeper transitional terrain. Vegetation is sagebrush with juniper on the higher slopes. Although no cultural modifications are evident, the area can be seen from U.S. Highway 89 and Circleville. |
| MP 129-MP 131 | 3 | Landform consists of restrictive steep canyon walls along he Sevier River. Sagebrush mixes and juniper are the primary vegetation types. The area is easily viewed from U.S. Highway 89, which traverses the area. |
| **Ancillary Facilities** Same as the proposed action. | | |

[1]Only those segments which would be significantly affected by the Sanpete Valley Alternative are described.

[2]Refer to table 3-10 for definitions of terms.

NOTE: To review the total visual resources which would be affected by this alternative, refer to MP 0 to MP 176 and MP 356 to MP 610 of the proposed action, which would correspondingly precede and follow the Sanpete Valley Alternative.

## Land Uses: Agriculture

The Sanpete Valley Alternative would traverse 131 miles of cropland producing the same crop types as the proposed action, with the exception that more of the cropland in this area is irrigated. See table 3-12 for acreages and mileages of cropland which would be affected.

The Sage Compressor Station would be located on native grazing land. Land use for the remaining surface facility sites is not known because specific locations are not available at this time.

## Socioeconomics

The socioeconomic conditions along the Sanpete Valley Alternative are similar to those of the RMPP. They are summarized in tables 3-13, 3-14, and 3-15.

## Cultural Resources

The discussion of cultural resources for the proposed action also applies to the portion of the Sanpete Valley Alternative which is identical.

A moderate to high site density is projected where this alternative would traverse the Sanpete Valley. The area in the Sevier River Valley which would be traversed by this alternative has a high site density of significant cultural resources.

Several major Fremont sites have been excavated in the Parowan Valley (between MP 150 to MP 200). These include Paragonah (Meighan et. al. 1956), Parowan, Evans Mound (Berry 1972), and Median Village (Marwitt 1970). Paragonah is listed on the National Register of Historic Places; Median Village is listed on the Utah State Register.

## Geology and Topography

### GEOLOGY

With the exception of the first 10 miles and last 25 miles, this entire alternative would parallel, be adjacent to, or cross active faults. Therefore, most of this 165 miles of the alternative should be considered subject to fault rupture hazard. In addition, the alternative would be nearly parallel to the faulting.

About 145 miles of the alternative would experience an expected peak acceleration of 10 to 20 percent g, with the remainder experiencing 4 to 10 percent g. At least 115 miles of this alternative would be subject to high liquefaction potential.

No significant landslide or volcanic hazards other than ash falls exist for this route.

### TOPOGRAPHY

This 200-mile long alternative would cross rougher terrain than the 180 miles of the proposed route (MP 176 to MP 356) it would replace. Specific problem areas include MP 95 to MP 105 and MP 130 to MP 150. The only sidehill construction of potential significance would occur south of the town of

Sevier between MP 96 and MP 103 and in Circleville Canyon, MP 128 to MP 131, of the alternative.

## Water Resources

The Sanpete Valley Alternative would cross 41 intermittent streams and 44 perennial streams.

# ALTERNATIVE C--CENTRAL NEVADA ALTERNATIVE

## Vegetation

The Central Nevada Alternative would traverse or have permanent installations on 41 miles of forest, 94 miles of mountain brush, 130 miles of sagebrush, 101 miles of pinyon-juniper, 208 miles of saltbush-greasewood and 181 miles of creosote bush vegetation. Cacti and Joshua trees are scattered throughout saltbush-greasewood and creosote bush vegetation types. Miles of each vegetation type that would be affected are summarized in table 3-1 and located on map S-24. These areas are used largely for livestock grazing, wildlife habitat, recreation, watersheds, and forest products.

## Wildlife

This discussion concerns only the portion of the Central Nevada Alternative which does not coincide with the proposed route.

According to the Utah Division of Wildlife Resources, this alternative would parallel existing paved highways in Utah and 'No area along this route would be considered critical wildlife habitat, although species typical of the various vegetation types would suffer minor disturbance in the short-term' (Day 1981).

### MAMMALS

The Central Nevada Alternative would first encounter winter ranges for mule deer in Nevada near Sacramento Pass in the Snake Range (MP 156 to MP 158), then in the Connors Canyon area (MP 179 to MP 180). In the Murry Summit (MP 205 to MP 207) and Ellison Creek areas (MP 224 to MP 230), the alternative would also cross deer winter ranges. West of Currant Summit, a large area of deer winter range--about 13 miles (MP 234 to MP 247)-- would be crossed. As the alternative left Nevada and entered California, it would parallel a small area of deer winter range for about 8 miles at the head of Queen Valley (MP 428 to MP 435). About 7 miles (MP 439 to MP 446) of another winter range area would be crossed in Hammil Valley. about 7 miles (MP 439 to 446).

Winter ranges for Tule elk would be traversed west and north of Black Mountain (MP 471 to MP 480), and east of Big Pine, California (MP 487 to MP 490). Important calving areas are found in the Silver Canyon (MP 460 to MP 464), Black Canyon (MP 467 to MP 474), and Harkless Flat areas (MP 487 to MP 490). Because of this species' limited distribution and the high interest placed on it by the State of California, care should be taken not to disturb these animals during critical periods of the year.

Desert bighorn sheep can be found in the Monte Cristo Range west of Tonopah, Nevada. These sheep would migrate across this alternative in two places: from the Monte Cristo Range to Lone Mountain and back (MP 385 to MP 390) and from the Monte Cristo Range to the Emigrant Peak area and back (MP 395 to MP 397).

### BIRDS

Sage grouse habitat occurs in Nevada from about Mill Creek to Willow Patch Spring (MP 145 to MP 150). In the Layton Spring area, the alternative would cross sagebrush habitat and pass within 2 miles of a known strutting ground (MP 165 to MP 169). From Cooper Wash to the Murry Canyon area (MP 187 to MP 196), the alternative would traverse known sagebrush habitat, a strutting ground, and a heavily used brood area. From Murry Summit, the alternative route would cross habitat for about 7 miles (MP 200 to MP 207). The Central Nevada Alternative would pass within 2 miles of a strutting ground and through two brood areas in the vicinity of Geroup Wash (MP 206). The last known area of sagebrush habitat for this bird which the alternative would cross about 8 miles in the vicinity of the Currant Ranch (MP 240 to MP 248). No known strutting grounds or brood areas occur near the alternative.

The alternative would first encounter chukars along Currant Creek about 5 miles west of Currant Summit for about 11 miles (MP 238 to MP 249). The Nevada Department of Fish and Game rates populations low in this area. Another chukar area would be traversed west from about Black Rock

Spring for about 8 miles (MP 271 to MP 279). These birds would also be found along the alternative between Palisade Mesa and Malligan Mesa (MP 285 to MP 287), in the Warm Springs area (MP 310), and near Fivemile Spring (MP 324). Chukar habitat with a low population density rating would be crossed west of Moroni for about 13 miles (MP 325 to MP 338). An 8-mile long stretch of medium density habitat would be encountered in the Slime Wash area (MP 360 to MP 366). Within this area, a 4-mile long section (MP 361 to MP 365) is rated as a high density area. As this alternative approached the Nevada/California border, it would cross a 6-mile long stretch of low density habitat at the head of Queen Valley (MP 421 to MP 427).

Nesting habitat for goshawks, Cooper's, and sharp-shinned hawks would be found in the Sacramento Pass area (MP 152 to MP 154) and again in the Currant Summit area (MP 235 to MP 238). There is favorable nesting habitat for cliff nesting raptors on the west side of Hot Creek Valley to about Black Butte (MP 330 to MP 334) and within the vicinity of McKinney Tanks (MP 340). These cliff areas would not be crossed by the alternative for the most part, but in the area of McKinney Tanks, the alternative would traverse a cliff nesting area.

As this alternative passed along the west side of Owens Lake in California (MP 525 to MP 542), it would be very near wetland habitat utilized by nesting waterfowl species. Tinemaha Reservoir (MP 485 to MP 487) is one of the few remaining wetlands in the Owens Valley and thus winters many ducks and geese. Little Lake is also a favored winter ground for pintail ducks (MP 565 to MP 569).

### FEDERAL AND STATE LISTED SPECIES

Habitats of two federally-listed species would be crossed by this alternative. The black-footed ferret habitat would be crossed in the same areas as along the proposed action. The Railroad Valley springfish habitat at Big Spring could be crossed by the alternative near Lockes, Nevada.

Habitat of the Mohave ground squirrel (state-listed as rare) would be crossed by the alternative in Kern and San Bernardino Counties in California. The general distribution is from about MP 540 to the end of the alternative near Adelanto, California.

This alternative would cross desert tortoise habitat from about the Red Mountain area to about the Fremont Peak area (MP 610 to MP 621), a distance of about 11 miles, and from the Kramer Hills area south to Adelanto, California (MP 641 to MP 661), a distance of about 20 miles. The alternative would also cross tortoise habitat from Adelanto to just north of Helendale, California (MP 0 to MP 15), about 15 miles. This species is listed as protected by the State of California.

## Soils

The Central Nevada Alternative would most strongly affect the following soil groups: 102 miles of Soil Group 1, 74 miles of Soil Group 2, 162 miles of Soil Group 3, 66 miles of Soil Group 4, 40 miles of Soil Group 5, 38 miles of Soil Group 6, 8 miles of Soil Group 7, 18 miles of Soil Group 8, and 578 miles of Soil Group 9.

Refer to the discussion of the proposed action in this chapter and table 3-9 for additional soil information.

## Visual Resources

The Central Nevada Alternative would cross the distinctive landscapes of the Colorado Plateaus, Basin and Range, and Cascade-Sierra Mountains physiographic provinces and return to the Basin and Range physiographic province, where it would terminate in southern California. Landforms vary from a flat desert landscape with occasional steep slopes in the cross ranges of the Central Nevada mountains to the dramatic valleys of California dominated by the Sierra Nevada Mountains and the flat, hot Mojave Desert of southern California. Vegetation varies equally, from the desert species of sagebrush and saltbush, occasionally interrupted by agricultural areas or juniper or pinyon-juniper-covered ridges, through greasewood, shadscale, and low sagebrush zones. The alternative route would terminate in the hot desert region of sparse creosote bush, with intermingled cacti and occasional Joshua trees. Cultural modifications are dominant, since the alternative would closely parallel U.S. Highway 6 from central Utah westerly across Nevada to Bishop, California, where it would again closely parallel U.S. Highway 395 to its termination at an existing pipeline. Associated communities, utility lines, mining activity, aqueduct systems, and military facilities are found intermingled. The tabulation in table 3-28 describes those segments which contain significant visual impacts. (See table 3-11 for a summary of the total number of miles and acres for each VRM Class and VQO which would be crossed by the alternative.)

TABLE 3-28

AFFECTED ENVIRONMENT FOR VISUAL RESOURCES: CENTRAL NEVADA ALTERNATIVE

| MP | VRM Class and/ or VQO[2] | Description |
|---|---|---|
| **Pipeline[1]** | | |
| MP 109-MP 112 | 3 | Landform is a restricted, steep, rugged canyon where U.S. Highway 6/50 is located. Sagebrush and juniper are the dominant vegetative species. |
| MP 160-MP 163 | 2 | The alternative route would pass through the Swamp Cedar Natural Area. |
| MP 195-MP 201 | 2 | The alternative would enter the steep, enclosed, and restricted Murry Canyon. Vegetation is pinyon-juniper and sagebrush. The landscape is heavily modified by soil stabilization and range improvement projects, U.S. Highway 6, an aqueduct, local roads, urban fringe development, and the Ward Mountain Recreation Area at MP 200. |
| MP 232-MP 237 | PR | This portion of the Humboldt National Forest is a steep restrictive canyon with pinyon-juniper vegetation. U.S. Highway 6, Currant Creek Campground, a gravel pit, and gold mining are evidenced in the area. |
| MP 268-MP 274 | 2 | Landform consists of a restricted canyon with pinyon-juniper as the vegetative cover. U.S. Highway 6 is located in this canyon. |
| MP 278-MP 280 | 2 | Landform is gently rolling, covered with low sagebrush and saltbush, and viewed from U.S. Highway 6 which passes through the area. |
| MP 310-MP 314 | 2 | Landform is a rolling mountain pass covered with juniper. U.S. Highway 6 also occupies the pass. |
| MP 329-MP 331 | R,PR | Landform is gently sloping where the alternative would enter the Toiyabe National Forest. Scattered juniper and low sagebrush are the dominant vegetation types. U.S. Highway 6 passes through the area. |
| MP 332-MP 338 | R,PR | Landform is gently rolling, with scattered juniper and low sagebrush cover. U.S. Highway 6 is parallel to the alternative. |
| MP 338-MP 341 | R,MM | The gently rolling landscape is vegetated with scattered juniper and low sagebrush. U.S. Highway 6 traverses the area, and water tanks are evident. |
| MP 356-MP 358 | 2 | The gently rolling landscape forms the saddle in a mountainous terrain which supports the City of Tonopah and its urbanized area, as well as U.S. Highway 6. Vegetation consists of juniper and low sagebrush. |
| MP 546-MP 554 | 2,3 | The alternative lies within a restricted canyon between a transitional slope and reservoir/lake. Creosote bush is the predominant vegetation. Modifications include U.S. Highway 395, a railroad, aqueduct, and transmission line. |
| MP 569-MP 576 | 2 | Landform consists of a flat valley bottom with portions overlain with a rough lava flow. Creosote bush is the predominant vegetation. U.S. Highway 395, a railroad, and a transmission line dominate the area. |
| MP 600-MP 606 | 2,3 | The rolling hills are covered by scattered creosote bush and cacti. A substation, transmission line, U.S. Highway 395, railroad, and primitive roads are the modifications. |
| **Ancillary Facilities[3]** | | |
| Tonopah, Nevada Vicinity | 3 | Tonopah maintenance base. Landform is flat to gently sloping or steep slopes if located within the Tonopah urbanized area. The vegetative cover consists of a sparse sagebrush pattern. Cultural modifications include the urbanized area of Tonopah and is surroundings, the airport, and growth trends in the vicinity of the airport. |

TABLE 3-28—Continued

| MP | VRM Class and/ or VQO[2] | Description |
|---|---|---|
| Inyokern, California Vicinity | 3 | Inyokern maintenance base. The flat valley bottom is agriculturalized in irrigated areas, surrounded by creosote bush. Cultural modifications include U.S. Highway 395, the communities of Inyokern and Ridgecrest, and associated agricultural structures and utilities. |

[1]Only those segments and facilities which would be significantly affected by the Central Nevada Alternative are described.

[2]Refer to table 3-10 for definitions of terms.

[3]The Sage Compressor Station and maintenance base are the same as those for the proposed action. Refer to the proposed action discussion for location and description of these facilities.

NOTE: To review the total visual resources which would be affected by this alternative, refer to MP 0 to MP 196 of the proposed action, which would precede the Central Nevada Alternative.

# Land Uses: Wilderness, Agriculture, and Conflicts with Land Use Plans, Policies, and Controls

## WILDERNESS

The Central Nevada Alternative pipeline route would cross the BLM Wilderness Study Area (WSA) U-050-078, commonly called the Notch Peak WSA, in west-central Utah approximately between MP 96 and MP 100 (BLM November 1980b). This WSA unit's southern boundary abuts the U.S. Highway 6/ 50 right- of-way. The alternative pipeline route would pass immediately north of the highway, thus crossing WSA U-050-078, shown on map S-20 of the *Graphic Supplement*.

In Nevada, BLM WSA NV-060-059, also known as the Rawhide Mountain WSA, would be crossed by the alternative pipeline route at approximately MP 308 (BLM November 1980a). The southeast corner of the WSA unit abuts the U.S. Highway 6 right-of-way. The alternative pipeline route would be north of the highway, thus crossing this WSA.

No other federally designated Wilderness Areas, WSA's designated by the BLM, the second Roadless Area Review and Evaluation (RARE II) units recommended for wilderness or future planning areas by the FS, or proposed or existing State Wilderness Areas would be crossed by any components of this alternative.

## AGRICULTURE

The Central Nevada Alternative would traverse 107 miles of cropland including small acreages of irrigated cropland used mainly for livestock feed west of Delta, Utah. The immediate area surrounding Delta is an important irrigated agricultural area which produces small grains, alfalfa, and corn as its main crops and, to a limited extent, sugar beets. Much of the area has subsurface drainage systems. See table 3-12 for acreages and mileages of cropland that would be affected.

The Sage Compressor Station would be located on native grazing land. Land use for the remaining surface facility sites is not known because specific locations are not available at this time.

The Robinson Canyon Watershed near Ely, Nevada, would be crossed by this alternative pipeline route. The Watershed Project consists mainly of terraces and diversions constructed on steep side slopes to control runoff and reduce flash flooding.

## CONFLICTS WITH LAND USE PLANS, POLICIES, AND CONTROLS

The Central Nevada Alternative would pass through the Benton and Owens Valleys in California. The BLM is preparing the Benton-Owens Valley Management Framework Plan (MFP) which identifies a transmission line corridor. The Central Nevada Alternative would not follow this corridor.

This alternative would also pass through lands managed under the BLM's California Desert Plan which was finalized in December 1980. The plan designates utility corridors and contingency planning utility corridors. The alternative would not coincide with any utility corridors but would fall within a contingency utility corridor.

In addition, when the whole length of the alternative from Wyoming to California is considered, it, like the proposed action, would not coincide with

the Utility Corridor Rule in the proposed Forest Land Management Plan for the Uinta National Forest.

## Socioeconomics

Table 3-29 lists the pertinent socioeconomic characteristics of the regions affected by this alternative. All of the counties that would be crossed are rural, with 1977 population densities ranging from 0.2 to 44.1 people per square mile. Most people live in small communities and are typically employed in travel-related services or mining. Because the applicant is not proposing this alternative, it has not provided information on the location of potential construction spreads; instead, they were delineated using the RMPP as a model. For the same reason, the applicant has provided no information on the locations of maintenance bases or double- jointing yards. For this alternative, double-jointing yards could not be located at railheads, since there are no railroads in the vicinity of the alternative. The locations of the maintenance bases and double-jointing yards were also delineated using the RMPP as model. These appear in table 2-2. Because this alternative would use the first two spreads of the proposed route, they are omitted from this discussion.

TABLE 3-29

REGIONAL SOCIOECONOMIC PROFILE: CENTRAL NEVADA ALTERNATIVE

| Construction | MP | State | County | Estimated 1980 Population | Total 1979 Employment | Personal Income, 1977 (Million $) | Retail Sales, 1977 ($1,000) | Housing | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Hotel/ Motel Rooms | Campsites with Hookups |
| Pipeline Spread 1 | 0-110 | Utah | Juab, Millard | 15,350 | 5,645 | 50.46 | 34,441 | 427 | 230 |
| Pipeline Spread 2 | 110-220 | Utah<br>Nevada | Millard<br>White Pine | 17,384 | 6,663 | 80.04 | 58,984 | 224 | 176 |
| Pipeline Spread 3 | 220-330 | Nevada | White Pine, Nye | 17,280 | 5,060 | 86.69 | 56,151 | 239 | 164 |
| Pipeline Spread 4 | 330-444 | Nevada | Nye, Esmeralda, Mineral. | 16,010 | 4,630 | 75.46 | 33,303 | 125 | 76 |
| Pipeline Spread 5 | 444-564 | California | Mono, Inyo | 28,200 | 14,575 | 148.60 | 105,929 | 561 | 120 |
| Pipeline Spread 6 | 564-694 | California | Inyokern, San Bernardino. | 1,239,300 | 770,375 | 6,181.5 | 3,854,179 | 2,122 | 827 |

Sources: Appendix B, tables B-1, B-3, B-4, and B-5.

## Cultural Resources

The discussion of cultural resources for the proposed action also applies to this alternative where the routes are identified.

This alternative would cross the Sevier-Escalante Desert and parallel the Sevier River. Along the Sevier River drainage, the site density is projected as moderate to high, with numerous residential camps. Site density is projected as low to moderate where the alternative would traverse the Sevier-Escalante Desert. A high density of seasonal and special use sites are expected where the alternative traverses Steptoe Valley. In Railroad Valley (near MP 260), there are recorded sites representing every period of human occupation from Paleo-Indian to Northern Paiute. There is a high site density of sites in Hot Creek Valley.

This alternative would cross the inlet area of the Pleistocene Lake Tonopah (near MP 370). Previous surveys indicate sites representative of the Paleo-Indian period. This area is considered highly sensitive for cultural resources.

Previous studies indicate a high site density for the Owens Valley area which would be traversed by the alternative. Site types are varied and include permanent villages, irrigation canals, seasonal collection sites, hunting, and sacred sites. The alternative would traverse Rose Valley near the Coso Hot Springs sacred area listed on the National Register of Historical Places and the Sugarloaf Mountain obsidian quarry area.

## Geology and Topography

### GEOLOGY

The Central Nevada Alternative would pass through one of the most tectonically active areas in the United States. Large earthquakes, accompanied by 20 feet of fault displacement, have occurred in Owens Valley in historic times. Geologically recent lava flows abound.

Potentially active faults would be crossed at MP 26, MP 243, MP 270, MP 309, MP 326 to MP 341 (six faults), and MP 439; others might be crossed at MP 393 and between MP 423 and MP 428. In addition, the Garlock fault would be crossed at MP 603. Three faults, including the Lockhart and South Lockhart faults, would be crossed between MP 624 and MP 629. Between MP 642 and MP 644, the Kramer Hills, Spring, and an unnamed fault would be crossed, and at MP 653, the Blake Ranch fault would be crossed.

Although all of these faults would threaten the integrity of a pipeline, the alternative would also parallel the Owens Valley fault zone from MP 431 to MP 577. Historic ruptures have occurred between MP 485 and MP 545, and the last 25 miles of the alternative in this segment would coincide with the location of these ruptures.

As would be expected in an area of this nature, the ground motions generated by earthquakes are quite high. For the entire alternative, they are distributed as follows:

| | |
|---|---|
| Less than 0.40 g | 139 miles |
| 0.04-0.10 g | 41 miles |
| 0.10-0.20 g | 202 miles |
| 0.20-0.40 g | 74 miles |
| 0.40-0.60 g | 92 miles |
| Greater than 0.60 g | 118 miles |

About 180 miles would be in UBC Zone 2, 230 miles in UBC Zone 3, and 250 miles in UBC Zone 4.

There is liquefaction potential at MP 15 and between MP 30 and MP 46. Specific analysis of liquefaction hazard was not attempted beyond MP 315 because of the limited water table and soils information; whenever the alternative would encounter the water table beyond this point, a high potential for liquefaction is likely because of the high expected ground motion.

There would be a potential for varying severity of volcanic ash fall from MP 108 to the end of the alternative. In the Pancake Range, MP 265 to MP 294, and from MP 415 to MP 421, MP 558 to MP 573, and MP 616 to MP 626 there would be a potential for lava flows.

The potential for landslides exists in the Egan Range, MP 195 to MP 200, and in the Pancake Range, MP 265 to MP 294. There could also be landslide difficulty between about MP 423 and MP 568. In this region, areas of landslide potential closely border the route, and the potential that new and old slides could be activated by earthquakes could affect the reliability of a pipeline along this alternative.

### TOPOGRAPHY

This 666-mile long alternative would cross terrain similar to the 414 miles of the proposed route (MP 196 to MP 610) it would replace. While construction difficulty over portions of each route would be similar, the alternative would traverse several mountain passes and canyons and would therefore take more time and be more difficult to construct.

Some sidehill construction would be required in Leamington Canyon, and the presence of the Sevier River, Utah Highway 132, the Union Pacific Railroad, and McIntyre and Central Utah Canals would complicate construction here.

Substantial sidehill construction may also be anticipated in the following mountain ranges: Confusion, Snake, Schell Creek, and Egan.

## Water Resources

The Central Nevada Alternative would cross 44 intermittent streams and 44 perennial streams.

## Air Quality

The Central Nevada Alternative would be located in the following AQCR's:

| | |
|---|---|
| Wyoming | Wyoming Intrastate (AQCR 243) |
| Utah | Four Corners Intrastate (EPA-014) |
| | Utah Intrastate (219) |
| | Wasatch Front (220) |
| Nevada | Nevada Intrastate Air Quality Control Region (AQCR 147) |
| California | South Coast Air Quality Management District |

The ambient air quality standards for Wyoming, Utah, Nevada, and California can be found in table 3-18. The ambient air quality along the alternative route is generally good. However, a portion of White Pine County (Steptoe Valley, Nevada) exceeds the primary standard for $SO_2$ and a portion of Nye County, Nevada, south of the alternative route does not meet the primary standard for TSP. San Bernardino County, California, is the exception to the good air quality in this area. It exceeds the primary standard for TSP, CO, photochemical oxidents and nitrogen dioxide ($NO_2$). The attainment status for each county along the alternative right-of-way is shown in table 3-30. The additional compressor stations required to transport 800,000 Mcfd would be located in White Pine, Nye, and Esmeralda Counties, Nevada. All of these counties are in attainment for $NO_x$ and CO, the major gaseous emissions from gas-turbine compressors.

The Central Nevada Alternative would require the installation of 25,650 hp. of compression at the Sage Compressor Station to transport 413,000 Mcfd of natural gas. To transport 800,000 Mcfd, an additional 26,750 hp. would be required at the Sage Compressor Station. In addition, three compressor stations would have to be constructed in White Pine, Nye, and Esmeralda Counties, Nevada. For this alternative, the ambient air quality at the Sage Compressor Station and booster stations has been assumed to be the same as for the RMPP.

The Class I area nearest the alternative pipeline right-of-way is the Yosemite National Park in Tuolumne County, California, 60 miles away. The Class I area nearest the Sage Compressor Station would be the combined Yellowstone and Grand Teton National Parks, about 140 miles northwest of the proposed site in Teton County, Wyoming. Capitol Reef National Park, a Class I area, would be 150 miles southeast of the proposed site in Wayne and Garfield Counties, Utah. Bryce Canyon and Zion National Parks would be about 130 and 100 miles, respectively, southeast of the compressor station in White Pine County, Nevada. Bryce Canyon National Park is in Garfield and Kane Counties, Utah, while Zion National Park is in Washington County, Utah. The only other Class I area within 150 miles of this alternative would be the Jarbridge Wilderness in Elko County, Nevada. It is located 180 miles north of the compressor station in White Pine County, Nevada.

TABLE 3-30

AMBIENT AIR QUALITY ATTAINMENT STATUS FOR COUNTIES ALONG THE CENTRAL NEVADA ALTERNATIVE

| [a]County | State | Total Suspended Particulates | Sulfur Dioxide | Photochemical Oxidants | Carbon Monoxide | Nitrogen Dioxide |
|---|---|---|---|---|---|---|
| Millard | Utah | [b]B | B | [c]C/B | C/B | C/B |
| White Pine | Nevada | C/B | [d]P | C/B | C/B | C/B |
| Nye | Nevada | [e]P | B | C/B | C/B | C/B |
| Esmeralda | Nevada | B | B | C/B | C/B | C/B |
| San Bernardino | California | P | B | P | P | P |

[a]The Central Nevada Alternative would follow the proposed RMPP route for the first 195 miles. The attainment status for these counties appears in the discussion of the RMPP.

[b]B--Better than national standards.

[c]C/B--Cannot be classified or better than national standards.

[d]P--Does not meet primary standards. Only a portion of Steptoe Valley in White Pine County is in nonattainment for $SO_2$.

[e]Only a portion of Nye County exceeds the primary TSP standard of the NAAQS.

# ALTERNATIVE D--SEVIER-ESCALANTE DESERT ALTERNATIVE

## Vegetation

The Sevier-Escalante Desert Alternative would traverse or have permanent installations on 32 miles of forest vegetation, 97 miles of mountain brush, 50 miles of sagebrush, 71 miles of pinyon-juniper, 86 miles of saltbush- greasewood, and 200 miles of creosote bush vegetation. Cacti and Joshua trees occur scattered throughout the saltbush-greasewood and creosote bush vegetation types. Miles of each vegetation type that would be affected are summarized on table 3-1, and located on map S-24. These areas are largely used for livestock grazing, wildlife habitat, recreation, watersheds, and forest products.

## Wildlife

This discussion addresses only the portion of the Sevier-Escalante Desert Alternative that is not identical to the proposed action (MP 196 to MP 364).

### MAMMALS

The Sevier-Escalante Desert Alternative would cross deer winter ranges near Government Spring and also west and south along the alternative to about Furner Ridge (MP 5 to MP 13). The next area of winter range which would be crossed by the alternative is from about Soma, Utah, to Leaminton, Utah (MP 19 to MP 27). The last area of winter range which would be encountered by the Sevier-Escalante Desert Alternative is from about Milford, Utah, to about Thermo Siding (MP 128 to MP 139).

### BIRDS

Sage grouse populations would be found in only one area along this alternative along Dog Valley Wash in Utah (MP 11 to MP 19). Except for one area from about MP 45 to MP 47 along Delta Reservoir, waterfowl habitat is lacking along this alternative. Cliff nesting raptors such as golden eagles, great horned owls, and prairie falcons find suitable nesting areas along this alternative in several areas. (These areas are indicated on table 3-7.) There is a golden eagle nest about 2 miles west of the alternative near MP 93 on the slopes of the Cricket Mountains.

### FEDERAL AND STATE LISTED SPECIES

The habitats of the federally-listed black-footed ferret and bald eagle would be crossed by this alternative in the same areas discussed for the proposed action. The habitat of the state-listed (Utah and Nevada) and protected (California) desert tortoise would be crossed in the same areas as discussed for the proposed action.

## Soils

The Sevier-Escalante Desert Alternative would most strongly affect the following soil groups: 108 miles of Soil Group 1, 19 miles of Soil Group 2, 60 miles of Soil Group 3, 5 miles of Soil Group 4, 47 miles of Soil Group 5, 17 miles of Soil Group 6, 3 miles of Soil Group 7, 14 miles of Soil Group 8, and 280 miles of Soil Group 9. Refer to the discussion of the proposed action in this chapter and table 3-9 for additional soil information.

## Visual Resources

The Sevier-Escalante Desert Alternative would be almost entirely within the Basin and Range physiographic province, with only the first 30 miles within the Colorado Plateaus physiographic province. Accordingly, the alternative would begin in a valley with mountainous terrain, while the remaining 150 miles would traverse a flat, broad valley bottom with an occasional variety of gently rolling hills. Likewise, the vegetation consists primarily of juniper and sagebrush in the first 30 miles but modifies to a low sagebrush, shadscale, and greasewood pattern with intermingled agricultural lands as the alternative would proceed southward. Typically, the cultural modifications include Federal, state, and local highways, primitive roads, various-sized communities, utilities, railroads, and agricultural and ranching structures along the alternative until it rejoined the proposed action (MP 364) at the southern end of the Escalante Desert.

The visual resources would not be significantly affected along this alternative. To review the total visual resources which this alternative would affect, refer to MP 0 to MP 196 and MP 364 to MP 610 of the proposed action which would correspondingly preceed and follow the Sevier-Escalante Desert Al-

ternative. (See table 3-11 for a summary of the total number of miles and acres for each VRM Class and VQO which would be crossed by the alternative.)

## Land Uses: Agriculture

The Sevier-Escalante Desert Alternative would traverse 84 miles of cropland with the same crop types as the proposed action. See table 3-12 for acreages and mileages of cropland affected. The Sage Compressor Station would be located on native grazing land. Land use for the remaining surface facility sites is not known because specific locations are not available at this time.

## Socioeconomics

The socioeconomic conditions near the Sevier-Escalante Desert Alternative are similar to those of the RMPP. They are summarized in tables 3-13, 3-14, and 3-15.

## Cultural Resources

The discussion of cultural resources for the proposed action and the Central Nevada Alternative also applies to the Sevier-Escalante Desert Alternative where the routes are identical.

Site density is projected as moderate to high where this alternative would parallel the Sevier and Beaver Rivers. Fort Desert, near MP 60, and a Paleo- Indian campsite, near MP 75, are listed on the National Register of Historic Places. Site density is projected as low to moderate where the alternative would cross the Escalante Desert.

## Geology and Topography

### GEOLOGY

This alternative would cross a portion of the Wasatch Fault Zone at MP 27. No other active faults would be crossed. Expected ground motion values are distributed as follows:

| | |
|---|---|
| 40.04-0.10 g | 84.8 miles |
| 0.10-0.20 g | 69.5 miles |
| Greater than 0.20 g | 30.5 miles |

The last category includes no areas greater than 0.21 g.

Approximately 18 miles of this alternative (MP 30 to MP 50) exhibit high liquefaction potential.

The southern 50 miles of the alternative could be subject to ash falls, and southwest of Delta, Utah, between MP 60 and MP 120, it would pass through an area of potential volcanic activity.

No areas of landslide potential would be crossed.

### TOPOGRAPHY

This 182-mile long alternative would cross slightly gentler terrain than the 168 miles of proposed route (MP 196 to MP 364) it would replace. No overall significant difference in construction difficulty because of terrain would be expected. To avoid an imposing ridge of bedrock which the proposed route would cross, the alternative would traverse Leamington Canyon; however, congestion and side-hill construction, described for the Central Nevada Alternative, would be a problem for the alternative.

## Water Resources

The Sevier-Escalante Desert Alternative would cross 29 intermittent streams and 35 perennial streams.

# ALTERNATIVE E--WEST SALT LAKE ALTERNATIVE

## Vegetation

The West Salt Lake Alternative would traverse or have permanent installations located on 16 miles of forest, 8 miles of mountain brush, 145 miles of sagebrush, 133 miles of pinyon-juniper, 86 miles of

saltbush- greasewood, 193 miles of creosote bush, and 85 miles of barren land. Joshua trees and cacti are found scattered in the creosote bush and saltbush- greasewood vegetation types. These areas are largely used for livestock grazing, wildlife habitat, recreation, watersheds, and forest products. Miles of each vegetation type that would be affected are summarized in table 3-1 and located on map S-24.

## Wildlife

### MAMMALS

The area which would be traversed by the West Salt Lake Alternative in Wyoming from the Kemmerer Compressor Station to the vicinity of Boulder Ridge along Twin Creek (MP 0 to MP 10) is designated as critical deer winter range. The northwestern portion of Utah from Rabbit Creek north to about Lake Ridge (MP 15 to MP 20) and the area of the Pegram Loop in Idaho (MP 33 to MP 40) would cross critical deer winter range for about 7 miles. As this alternative left Idaho and entered Utah, it would first cross deer winter range at the Cache-Box Elder County boundary (MP 64 to MP 70), Blue Spring Hills/West Hills area (MP 73 to MP 86), and a 6-mile long area in the North Promontory Mountains area (MP 96 to MP 102). The area from approximately the Juab-Tooele County boundary south of Erickson Pass northward to about 6 miles north of Erickson Pass (MP 284 to MP 307) is also listed as critical habitat for deer (Day 1981).

Moose are occasionally seen in the Twin Creek area west of the Kemmerer Compressor Station to Boulder Ridge (MP 0 to MP 10). This area is not known as a regular wintering ground for this species, however. There are no known moose populations through the northeast corner of Utah and portions of Idaho where the alternative would pass.

American elk winter along Twin Creek in Wyoming; about 10 miles (MP 0 to MP 10) of their winter range would be crossed. Apparently they do not winter in the areas of Utah or Idaho which this alternative would traverse.

Year-round ranges for pronghorn would be crossed by this alternative from the North Promontory Mountains west across Salt Wells Flat to about Kelton, Utah, and south to about Peplin Flats (MP 102 to MP 141), a distance of about 39 miles. Another area of year-round pronghorn range would be crossed from about the Simpson Mountains to southwest of Sand Mountain (MP 293 to MP 320). From MP 270 to MP 285 on the proposed action portion of this alternative, another pronghorn area would be crossed from White Sage Flats to about Cove Creek.

### BIRDS

This alternative would cross minor sage grouse habitat in Wyoming from MP 0 to MP 8 along Twin Creek. Winter concentration areas would be traversed in Utah in the vicinity of Rabbit Creek (MP 15 to MP 18), and a strutting ground might be crossed near South Lake (MP 19). In Idaho, small populations of this bird would be found in the vicinity of the Pegram Compressor Station at about MP 34. As the alternative reentered Utah, it would cross an area of year-long sage grouse habitat from the Hansel Mountains for about 8 miles (MP 120 to MP 128). Another area of year-round range west of the Hogup Mountains would be crossed for about 19 miles (MP 142 to MP 161). A 5-mile long stretch of year- round habitat would be crossed near the Sheep Mountain Area (MP 292 to MP 297).

The gray partridge could occur wherever suitable habitat is found along this alternative for about 110 miles from the Utah/Idaho state line (about MP 53 to about MP 163).

In the north-central portion of Utah where this alternative would enter from Idaho, the ring-necked pheasant would be encountered in all agricultural areas north of Cornish to near Bothwell, Utah (MP 54 to MP 86). A small agricultural area that furnishes habitat for this bird is also located in Blue Creek Valley in Utah (MP 91 to MP 98).

The sharp-tailed grouse would be found along this alternative from about Riverside, Utah, to the Blue Spring Hills (MP 71 to MP 94), an area which furnishes year-round habitat for this species.

The chukar partridge would be found in several areas traversed by this pipeline alternative. Populations occur west and south of Clarkston, Utah, toward Casper Springs (MP 63 to MP 67) and from about Plymouth to the Hansel Mountains (MP 71 to MP 116). The area in the vicinity of the Hogup Mountains (MP 143 to MP 162) is also a good area for these birds. Just west of the Newfoundland Mountains (MP 169 to MP 175), the alternative would cross good chukar habitat, as well as the area west of the Sheeprock Mountains (MP 285 to MP 296).

Marginal Waterfowl habitat would be crossed by this alternative from about MP 0 to MP 11 along the Kemmerer Loop (along Twin Creek west of Kemmerer). Higher quality waterfowl nesting areas would be encountered from about MP 11 to MP 21 along the Bear River south of the Utah/Idaho state line.

This alternative would pass within about 1 mile of a good nesting area in the Hogup Mountains from about MP 150 to MP 161. The Newfoundland Mountains from about MP 177 to MP 180 also furnish good raptor nesting habitat.

### FEDERAL AND STATE LISTED SPECIES

The black-footed ferret, bald eagle, and desert tortoise, each federally listed species, could all be affected by this alternative in areas identified for the proposed action.

The desert tortoise, a state-listed species which could be affected in Utah, Nevada, and California, is discussed under 'Proposed Action'.

## Soils

The West Salt Lake Alternative would most strongly affect the following soil groups: 31 miles of Soil Group 1, 23 miles of Soil Group 2, 73 miles of Soil Group 3, 4 miles of Soil Group 4, 47 miles of Soil Group 5, 35 miles of Soil Group 6, 74 miles of Soil Group 7, 14 miles of Soil Group 8, and 391 miles of Soil Group 9. Refer to the discussion of the proposed action in this chapter and table 3-9 for additional soil information.

## Visual Resources

The West Salt Lake Alternative would traverse the Middle Rocky Mountains and Basin and Range physiographic provinces. Landforms vary from flat valleys and transitional slopes along the northern portions of the alternative to broad, expansive flat areas of the distinctive Great Salt Lake Desert and the occasional rolling hills of the intermingled valleys to the south, where the alternative would join the proposed action near Fillmore. Similarly, the vegetation varies from the northern species of high sagebrush, mountain brush, pockets of aspen, conifer, and juniper to the central Utah plants of low growing sagebrush, saltbush, greasewood, and shadscale.

Cultural modifications consist of Federal, state, and local roads, smaller communities, railroads, transmission lines, and agricultural structures. The tabulation in table 3-31 describes those segments which would experience significant visual impacts. (See table 3-11 for a summary of the total number of miles and acres for each VRM Class and VQO which would be significantly affected by the alternative.)

TABLE 3-31

AFFECTED ENVIRONMENT FOR VISUAL RESOURCES: WEST SALT LAKE ALTERNATIVE

| MP[1] | VQO[2] | Description |
|---|---|---|
| **Pipeline[1]** | | |
| Beginning at Montpelier, ID | | |
| MP 11-MP 18 | R | Landform is rugged mountain slopes with intermingled valleys where the alternative would enter the Caribou National Forest. Vegetation consists of tall conifer and aspen timber types. Modifications consist of State Highway 36, a transmission line and clearing, and recreational use areas. |
| MP 18-MP 23 | R | Landform changes to steep dissected canyons with tall conifer and aspen vegetation. State Highway 36, which is used as access for recretaion activities, would be paralleled by the alternative. |
| **Ancillary Facilities** | | |
| MP 0 | MP 4 | Montpelier Compressor Station and maintenance base. Landform consists of the flat valley bottom along the Bear River. The area is highly agriculturalized. Cultural modifications include urban fringe development and agricultural structures and the area can be viewed from the community of Montpelier and U.S. Highways 89 and 30N. |

[1]Only those segments and facilities which would be significantly affected by the West Salt Lake Alternative are described. The visual resource would not be significantly affected along the Kemmerer Loop (MP 0 to MP 21.7). The visual resource would not be significantly affected along the Pegram Loop (MP 33.5 t MP 40.5).

[2]Refer to table 3-10 for definitions of terms.

NOTE: To review the total visual resources which would be affected by this alternative, refer to MP 254 to MP 610 of the proposed action, which would follow the West Salt Lake Alternative.

## Land Uses: Recreation Resources, Agriculture, and Conflicts with Land Use Plans, Policies, and Controls

### RECREATION RESOURCES

The West Salt Lake Alternative would follow the general alignment of State Highway 36 (also known as the Emigration Canyon Road) through approximately 12 miles of the Caribou National Forest in southeastern Idaho (located approximately between MP 10 and MP 22). The area surrounding the highway in the canyon has a high recreational use (FS 1978). Such recreational experiences as hunting and fishing (Strawberry Creek), gathering firewood along the highway, viewing scenery (Emigration, Williams, and Strawberry Canyons), and camping at the Emigration Pass campground are noted for this area.

### AGRICULTURE

The West Salt Lake Alternative would traverse 87 miles of cropland which produces crops similar to those of the proposed project area. See table 3-12 for acreages and mileages of cropland that would be affected.

Estimates of surface facility sites for this alternative which might affect agricultural lands (including a proposed compressor station in the vicinity of Montpelier, Idaho), are indicated in table 3-12).

### CONFLICTS WITH LAND USE PLANS, POLICIES, AND CONTROLS

No known conflicts with land use plans or policies would be caused by the West Salt Lake Alternative. However, when the total length from Wyoming to California is considered, it, like the proposed action, would not coincide with the 3,000-foot wide BLM utility corridor through 70,000 acres transferred from BLM administration to the Moapa Indian Reservation.

## Socioeconomics

Most of the counties that would be affected by the construction of the West Salt Lake Alternative are rural, with population densities ranging from 1.3 to 13.4 people per square mile. The exception is Cache County, Utah, which has a population density of 48.7 people per square mile. The small economy of the two counties that would be crossed by the alternative in Idaho- -Bear Lake and Franklin--is orientated toward agriculture, especially beef and dairy farming. The alternative area in Cache County, which lies south of Franklin County, is also agricultural. The recreation industry is prominent here because of the Caribou National Forest, which comprises a large percentage of southeastern Idaho. The remainder of the alternative would cross the Great Salt Lake Desert, which is virtually unpopulated. The counties here are Box Elder, Tooele, Juab, and Millard. Table 3-32 identifies the socioeconomic characteristics of the five regions which would be affected by this alternative; table 3-15 identifies the county property tax revenues in the alternative area.

To construct and operate the West Salt Lake Alternative, the applicant might use the double-jointing yard locations listed in table 2-2. These locations are presented merely for illustration and may in fact not be feasible because of engineering or logistical considerations; therefore, the socioeconomic characteristics of the sites are not considered in this analysis.

TABLE 3-32.

SOCIOECONOMICS PROFILE: WEST SALT LAKE ALTERNATIVE

| Construction | MP | State | Counties | Preliminary Population, 1980 | Average Employment, 1979 | Personal Income, 1977 ($1,000) | Retail Sales, 1977 ($1,000) | Housing | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Hotel/ Motel Rooms | Campsites with Hookups |
| [a]Montpelier Compressor Station | 0 | Idaho | Bear Lake | 3,114 | 2,492 | 15,295 | [b]13,473 | 128 | 64 |
| [c]Pipeline Spread 1 | 0-80 | Idaho | Bear Lake | 106,465 | 44,925 | 426,630 | 259,650 | 521 | 207 |
| | | Utah | Franklin, Cache, Box Elder. | | | | | | |
| Pipeline Spread 2 | 80-200 | Utah | Box Elder, Tooele | 59,224 | 23,719 | 266,410 | 128,040 | 556 | 90 |
| Pipeline Spread 3 | 200-300 | Utah | Tooele, Juab | 31,528 | 10,027 | 139,090 | 66,734 | 682 | 157 |

TABLE 3-32.—Continued

| Construction | MP | State | Counties | Preliminary Population, 1980 | Average Employment, 1979 | Personal Income, 1977 ($1,000) | Retail Sales, 1977 ($1,000) | Housing | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Hotel/ Motel Rooms | Campsites with Hookups |
| Pipeline Spread 4 | 300-363 | Utah | Millard | 8,736 | 3,439 | 31,220 | 18,724 | 247 | 73 |

[a]Because this construction work force would be stationary and near Montpelier, most of the impact would occur in Montpelier. Therefore, data are for Montpelier only.

[b]Derived by multiplying county retail sales by 0.75 to reflect sales in Montpelier. Multiplier is an estimate based on Montpelier's role as the trade center of the county.

[c]This spread would also construct 28 miles of pipeline loop along the Northwest pipeline between Kemmerer, Wyoming, and Montpelier, Idaho. Because this route would be the same as the Northern Systems Alternative, the socioeconomic profile of the Northern Systems Alternative is adopted by reference.

Sources: Idaho Department of Employment 1980. Mobil Oil Corporation 1980. Sargent 1980. Smith 1980. U.S. Department of Commerce, Bureau of the Census 1972. 1980a, 1980d, 1980e. Utah Industrial Development Division 1979. *Woodall's Campground Directory*1980.

## Cultural Resources

The discussions for the proposed action and Alternative A also apply to the West Salt Lake Alternative where the routes are identical.

This alternative would transect Bear Lake and Cache Valleys and associated drainages. In those areas, site density is projected as moderate to high with numerous residential or field camps (DeLisio 1971).

Site density is projected as low to moderate where the alternative would cross the flats of the Great Salt Lake, except where special use sites are located. Hogup Cave near MP 150 (Aikens 1970), is listed on the National Register of Historic Places.

## Geology and Topography

### GEOLOGY

Approximately 100 miles of this alternative would experience an expected ground motion of 0.20 to 0.21 g. Of the remaining route, 203 miles would fall between 0.1 g and 0.2 g; 60 miles would fall between 0.04 g and 0.1 g. Virtually the entire alternative would be in UBC Zone 3.

Potential fault hazard exists on the west side of Bear Lake Valley from MP 12 to MP 13, and faults which might pose a threat occur between MP 27 and MP 36 in the Bear River Range. Definite fault hazard would be present between MP 66 and MP 69 and between MP 111 and MP 113 in the Hansel Mountains.

Liquefaction potential exists in Bear Lake Valley (MP 0 to MP 7), in Cache Valley (MP 40 to MP 63), and probably between MP 70 and MP 80, MP 94 and MP 95, and MP 107 and MP 110. Additional areas of concern are the mud flats of the Great Salt Lake near Kelton (MP 125 to MP 135) and from MP 156 to MP 225, the western and southern portions of the Skull Valley (near MP 260), and the crossing of the Sevier River (MP 329 to MP 334).

Hazard from lava flows would be present at MP 122 and MP 140. No significant ash falls are likely. Landslides have not been reported along the alternative.

### TOPOGRAPHY

Portions of the Kemmerer and Pegram Loops (28.7 miles), already described for the Northern Systems Alternative, and the area between about MP 10 and MP 25 of this alternative would traverse rough terrain.

## Water Resources

The West Salt Lake Alternative would cross 20 intermittent streams and 21 perennial streams.

## Noise Quality

The noise environment adjacent to the Montpelier Compressor Station would be similar to that discussed for the RMPP. Existing sources of noise emissions in the vicinity are Idaho State Highways 10, 30N, and 89. The exact distance from each of these highways to the compressor station cannot be determined. The nearest residence to the Montpelier Compressor Station is also not known. However, the existing ambient noise levels at this site would be similar to the values for the Sage Compressor Station.

## Air Quality

The West Salt Lake Alternative would be located in the following AQCR's:

| | |
|---|---|
| Wyoming | Wyoming Intrastate (AQCR 243) |
| Idaho | Idaho Intrastate |
| Utah | Four Corners Intrastate (EPA-014) |
| | Utah Intrastate (219) |
| | Wasatch Front (220) |
| Nevada | Clark-Mohave-Yuma Interstate |
| | Nevada Interstate |
| California | South Coast Air Quality Management Districts |

The ambient air quality along this alternative route is generally good, typical of the nonindustrial areas of the Southwest. However, Bear Lake County, Idaho, exceeds the primary standard for TSP. The remainder of the counties along the West Salt Lake Alternative which do not coincide with those which the RMPP would traverse meet the primary and secondary standards for all criteria pollutants. The attainment status for each county along the West Salt Lake Alternative is shown in table 3-33. The status of the remainder of the counties, the same as those for the RMPP, can be found in table 3-19.

The alternative would install 23,350 hp. of compression in Bear Lake County, Idaho, and in the future might construct three booster stations in Box Elder (18,800 hp.), Millard (19,200 hp.), and Washington (9,050 hp.) Counties, Utah. To transport 800,000 Mcfd, the alternative would also require the addition of 29,050 hp. to the Montpelier Compressor Station. Table 3-20 lists the approximate maximum ambient air quality levels at these sites.

No Class I areas in Nevada and California would be affected because they would be more than 150 miles from the alternative compressor stations. The Class I area closest to the Montpelier Compressor Station would be the combined Yellowstone and Grand Teton National Parks, about 150 miles northeast of the compressor station. The compressor station in Millard County, Utah, would be located 60 miles to the northwest of Capitol Reef National Park in Utah. Zion National Park, the Class I area closest to the alternative route, would be located 35 miles due east of the compressor station in Washington County, Utah.

TABLE 3-33

AMBIENT AIR QUALITY ATTAINMENT STATUS FOR COUNTIES ALONG THE WEST SALT LAKE ALTERNATIVE

| [a]County | State | Total Suspended Particulates | Sulfur Dioxide | Photochemical Oxidants | Carbon Monoxide | Nitrogen Dioxide |
|---|---|---|---|---|---|---|
| Bear Lake | Idaho | [b]P | [c]B | [d]C/B | C/B | C/B |
| Box Elder | Utah | C/B | C/B | C/B | C/B | C/B |
| Tooele | Utah | C/B | P | C/B | C/B | C/B |
| Juab | Utah | C/B | C/B | C/B | C/B | C/B |

[a]The West Salt Lake Alternative would follow the proposed RMPP route from MP 225. The attainment status for these counties appears in the discussion of the RMPP.

[b]P--Does not meet primary standards. Only a portion of Steptoe Valley in White Pine County is in nonattainment for $SO_2$.

[c]B--Better than national standards.

[d]C/B--Cannot be classified or better than national standards.

# ALTERNATIVE F--PROVO CANYON ALTERNATIVE

## Vegetation

The Provo Canyon Alternative would traverse or have permanent installations located on 5 miles of forest, 45 miles of mountain brush, 133 miles of sagebrush, 87 miles of pinyon-juniper, 57 miles of saltbush- greasewood, and 193 miles of creosote bush vegetation. Joshua trees and cacti are scattered throughout saltbush-greasewood and creosote bush vegetation types. Mileages of each vegetation type that would be affected are summarized in table 3-1 and located on map S-24. These areas are largely used for livestock grazing, wildlife habitat, recreation, watersheds, and forest products.

## Wildlife

### MAMMALS AND BIRDS

The first deer winter range which would be encountered by this alternative after it left the proposed route is near Dutch Hollow Creek (MP 11). This area of winter range continues about 28 miles to near Mahogany Mountain northeast of American Fork (MP 39). Deer winter ranges would not be crossed again until the alternative neared Buckhorn

Mountain (MP 87); this area of winter range would then continue along the alternative until it rejoined the proposed action at MP 115 near Mills Valley.

Suitable cliff nesting habitat for raptors such a golden eagles, prairie falcons, and great horned owls would be found in a 19-mile long stretch of the Provo Canyon Alternative (MP 5 to MP 24). No golden eagle nests are known to be closer than 2 miles to their alternative.

### FEDERAL AND STATE LISTED SPECIES

The federally listed black-footed ferret, bald eagle, and desert tortoise could all be affected by this alternative in the areas affected by the proposed action.

The state-listed desert tortoise would be affected in the areas of Utah, Nevada, California noted for the proposed action.

## Soils

The Provo Canyon Alternative would most strongly affect the following soil groups: 61 miles of Soil Group 1, 24 miles of Soil Group 2, 35 miles of Soil Group 3, 5 miles of Soil Group 4, 47 miles of Soil Group 5, 16 miles of Soil Group 6, 4 miles of Soil Group 7, 17 miles of Soil Group 8, and 232 miles of Soil Group 9. Refer to the discussion of the proposed action in this chapter and table 3-9 for additional soil information.

## Visual Resources

The Provo Canyon Alternative would be within the Colorado Plateaus and Basin and Range physiographic provinces. Landform is characterized by transitional to steep, mountainous slopes of the Wasatch Range, with interspersed intermountain valleys and plateaus. Vegetation ranges from sagebrush on the valley bottom to juniper on the intermediate slopes and mountain brush and mixed conifer and aspen stands on the higher slopes. Cultural modifications range from large communities and cities, Federal and state highways, primitive roads, utilities, railroads, and ranching structures. Table 3-34 describes those segments which would experience significant visual impact. (See table 3-11 for a summary of the total number of miles and acres for each VRM Class and VQO which would be crossed by the alternative.)

TABLE 3-34

AFFECTED ENVIRONMENT FOR VISUAL RESOURCES: PROVO CANYON ALTERNATIVE

| MP | VRM Class and/ or VQO[2] | Description |
|---|---|---|
| **Pipeline**[1] | | |
| MP 7-MP 15 | 2 | Landform is a flat valley bottow with transitional slopes. Vegetation consists of sagebrush and agricultural areas. Cultural modifications are dominant and consist of Heber City and the surrounding urbanized area, U.S. Highway 40, and State Highway 233. The alternative would border the Wasatch Mountain State Park between MP 9 and MP 11. |
| MP 15-MP 21 | 2 | The steep side slopes extend upward from the Deer Creek Reservoir shoreline and are covered by sagebrush. Modifications include a scenic railroad line. The area borders the Wasatch Mountain State Park. The area can be viewed from Heber City and environs, the state park, and the railroad. |
| MP 21-MP 30 | R | The alternative route would follow the steep, rugged, and confined landform of the Provo Canyon sculptured by the Provo River as it enters the Uinta National Forest. Vegetation consists of a sagebrush, conifer and deciduous mixture, riparian, and domesticated species. Cultural modifications have extensively changed the character of the natural landscape and include U.S. Highway 189, a scenic railroad line, an aboveground water pipeline, a power generation plant and substation, gravel pits, the community of Olmstead, State Highway 52, many landform scars, recreation sites, Bridal Veil Falls recreation site, and numerous other urbanization modifications. The area is highly sensitive from all viewing positions. |

TABLE 3-34—Continued

| MP | VRM Class and/ or VQO[2] | Description |
|---|---|---|
| MP 30-MP 32 | R,2 | The transition to steep mountainous slopes, is covered with juniper higher up. The area is viewed from the Orem urbanized area. |
| MP 32-MP 33 | PR,3 | The steep slopes are covered with sagebrush, with juniper on the higher slopes. Cultural modifications include an aqueduct and primitive roads; the alternative right-of-way would be visible from the urbanized area. |
| MP 33-MP 35 | R,PR | The steep, mountainous slopes are vegetated with sagebrush and juniper. Primitive roads, an aqueduct, and a transmission line are visible modifications. The area is viewed from the urbanized areas and nearby estates. |
| MP 35-MP 38 | PR,2 | Landform consists of mountainous terrain with sagebrush and juniper vegetation. Cultural modifications include an aqueduct, primitive roads, and a transmission line. The area is viewed from the urbanized area. |
| MP 38-MP 53 | 2 | The landform varies from steep slopes, through transitional grades, to the flat valley bottom. Vegetation consists primarily of sagebrush. The alternative would be routed within an urbanized area surrounding the American Falls region. |

**Ancillary Facilities**
Same as the proposed action.

[1]Only those segments which would be significantly affected by the Provo Canyon Alternative are described.

[2]Refer to table 3-10 for definitions of terms.

NOTE: To review the total visual resource which would be affected by this alternative, refer to MP 0 to MP 108 and MP 214 to MP 610 of the proposed action which would correspondingly precede and follow the Provo Canyon Alternative.

## Land Uses: Agriculture and Conflicts with Land Use Plans, Policies, and Controls

### AGRICULTURE

The Provo Canyon Alternative would traverse 99 miles of cropland similar to that along the proposed action, with the exception of the area surrounding the city of Provo, which includes areas of small fruit orchards ranging from 1 to 10 acres. See table 3-12 for acreages and mileages of cropland affected.

The Sage Compressor Station would be located on native grazing land. Land use for the remaining surface facility sites is not known because specific locations are not available at this time.

### CONFLICTS WITH LAND USE PLANS, POLICIES, AND CONTROLS

No known conflicts with lands use plans or policies would be caused by the Provo Canyon Alternative. However, when the whole length of the alternative is considered, this alternative would not follow the 3,000-foot wide BLM utility corridor through the 70,000 acres transferred from BLM administration to the Moapa Indian Reservation.

## Socioeconomics

Table 3-35 lists the pertinent socioeconomic characteristics of the region that would be affected by the Provo Canyon Alternative. Table 3-15 identifies the property taxes in counties that would be crossed by the alternative. This alternative would diverge from the proposed route near Heber City, Utah, cross the Wasatch Range through Provo Canyon, circumvent the Provo-American Fork area, and connect with the proposed route near Mills, Utah. Most of the area is rural, with population densities ranging from 1.6 to 7.2 people per square mile.

Provo Canyon is a scenic tourist attraction in Utah. The canyon is also a major utility corridor, containing three municipal water pipelines, an aqueduct for a power company, two canals, a road, and a railroad. Because the canyon is narrow, it is congested by these utilities.

The town of Springdell, comprised mainly of recreational and seasonal homes, is also in Provo Canyon. The town's zoning ordinance prohibits the installation of high-pressure gas pipelines. North of Orem, the alternative would cross the municipal boundaries of either Cedar Hills, Highland, or Alpine City. The local zoning ordinances of these towns are unknown.

To construct this alternative, the applicant might use the double-jointing yards and maintenance bases that are listed in table 2-2. These locations are presented merely for illustration and may in fact not be feasible because of engineering or logistical considerations; therefore, the socioeconomic characteristics of the sites are not considered in this analysis.

TABLE 3-35

SOCIOECONOMIC PROFILE: PROVO CANYON ALTERNATIVE

| Construction | MP | State | Counties | Estimated Population, 1980 | Average Employment, 1979 | Average Unemployment, 1979 | Personal Income, 1977 ($1,000) | Retail Sales, 1977 ($1,000) | Hotel/ Motel Rooms | Campsites with Hookups |
|---|---|---|---|---|---|---|---|---|---|---|
| Pipeline Spread 1 | 0-100 | Utah ..... | Summit, Wasatch, Utah, Salt Lake, Juab. | 857,141 | 355,519 | 15,506 | 3,934,710 | 2,620,818 | 9,709 | 1,276 |

Sources: Mobil Oil Corporation 1980. Sargent 1980. U.S. Department of Commerce, Bureau of the Census 1972. 1980a, 1980d, 1980e. Utah Industrial Development Division 1979. *Woodall's Campground Directory*1980.

## Cultural Resources

The discussion for the proposed action also applies to the Provo Canyon Alternative where the routes are identical.

This alternative would transect the perimeter of Heber and Goshen Valleys and be routed near Lake Utah. These areas are projected to have moderate to high site densities. The alternative would traverse the area near the old town of Goshen (MP 80). Petroglyph and pictograph sites have been recorded in this area.

## Geology and Topography

The first 40 miles of this alternative would be subject to an expected ground motion of between 10 and 20 percent g. The remaining 75 miles would be subject to 20 to 21 percent g. Between MP 32 and MP 40, the alternative would parallel the Wasatch fault and be subject to fault rupture hazard; high potential for liquefaction occurs between MP 46 and MP 50 and for the last mile of the route.

No hazard from volcanic activity is present, but landsliding hazard exists between MP 27 and MP 30.

With the exception of Provo Canyon (alternative MP 20 to MP 32), topographic constraints on construction should be minimal. However, within the canyon, severe construction constraints would be imposed by the topography--exacerbated by the presence of the Denver and Rio Grande Western Railroad; Provo River; U.S. Highway 189; the Provo City, Utah Power and Light, Salt Lake City, and Orem City Aqueducts; and the Murdock and Alta Canals. Side slopes of 60 percent to more than 100 percent are dominant in this area.

## Water Resources

The Provo Canyon Alternative would cross 28 intermittent streams and 25 perennial streams.

# VARIATION 2--THISTLE CREEK VARIATION

## Vegetation

The Thistle Creek Variation would traverse 13 miles of sagebrush and 9 miles of pinyon-juniper vegetation. Miles of each vegetation type that would be affected are identified in table 3-1 and located on map S-24. These areas are used largely for livestock grazing, wildlife habitat, recreation, and watersheds.

## Wildlife

Deer winter ranges would be encountered along this variation in two locations, MP 0 to MP 2 and MP 9 to MP 27, for a total of 20 miles of winter range. (Refer to table 3-3 for additional information.)

Suitable cliff nesting habitat for raptors such as golden eagles, prairie falcons, and great horned owls would be found in a 19-mile long stretch of this variation. No golden eagle nests are known to occur in areas closer than 2 miles to the route.

## Soils

The Thistle Creek Variation would traverse 19 miles of Soil Group 1, which would be strongly affected by project construction. Refer to the discussion of the proposed action in this chapter and table 3-9 for additional soil information.

## Visual Resources

The Thistle Creek Variation would lie entirely within the Middle Rocky Mountains physiographic province. The physical characteristics are described in table 3-36 which illustrates how the variation would significantly affect the visual environment. (See table 3-11 for a summary of the number of miles and acres of each VRM Class which would be crossed by the variation.)

TABLE 3-36

AFFECTED ENVIRONMENT FOR VISUAL RESOURCES: THISTLE CREEK VARIATION

| MP | VRM Class and/ or VQO[2] | Description |
|---|---|---|
| **Pipeline[1]** | | |
| MP 0-MP 10 | 2 | Landform consists of the steep, restricted Soldier Creek Canyon through mountainous terrain. Vegetation consists of sagebrush with juniper on higher slopes. The variation would follow U.S. Highway 6/50, a railroad, and Soldier Creek and would bypass the community of Thistle. |
| MP 10-MP 23 | 3 | Landform is a steep, restricted canyon. Vegetation consists of sagebrush with juniper on the upper slopes. The route would follow a river, U.S. Highway 89, and a railroad. |
| **Ancillary Facilities[3]** | | |

[1]Only those segments which would be significantly affected by the Thistle Creek Variation are described.

[2]Refer to table 3-10 for definitions of terms.

[3]The ancillary facilities would not significantly affect the visual resource.

NOTE: The affected visual resources of this variation would replace the proposed action between MP 156 and MP 176.

## Land Uses: Agriculture

The Thistle Creek Variation would traverse approximately 6 miles of meadow lands used for hay and pasture (see table 3-12).

## Geology and Topography

This entire variation would be subject to an expected ground motion of 10 to 20 percent g; however, it would cross no active faults. No significant liquefaction potential exists along this variation, nor is there any hazard of volcanic activity. Between MP 11.6 and MP 14.6, there is a moderate potential for landsliding.

The variation, 27 miles long and about 7 miles longer than the stretch of proposed route (MP 156 to MP 176) it would replace, would require sidehill construction along about 50 percent of its length. While the entire variation would be within 200 feet of 5,800 feet in elevation, it would have to be constructed in narrow canyons already occupied by either Soldier or Thistle Creeks, U.S. Highways 6 or 89, and the Denver and Rio Grande Western Railroad. This portion of the proposed route would require sidehill construction on less than 20 percent of its length.

## Water Resources

The Thistle Creek Variation would cross two intermittent streams and five perennial streams.

## VARIATION 3--EAST LAS VEGAS VARIATION

## Vegetation

The East Las Vegas Variation would traverse 59 miles of creosote bush vegetation. Joshua trees and cacti occur scattered within creosote bush vegetation along the variation. Acreages and mileages of each vegetation type that would be affected are identified in table 3-1 and located on map S-24. These areas are used largely for recreation, wildlife habitat, and livestock grazing.

## Wildlife

The Dry Lake Range furnishes habitat for desert bighorn sheep which occasionally move into this area from the Muddy Mountains (about MP 488 of the proposed action). The East Las Vegas Variation would cross sheep range at the extreme western edge of the Sunrise Mountains (MP 14). It would cross a migration route between the River Mountains and the McCullough Range (MP 28) as well as sheep habitat on the lower slopes of the McCullough Range (MP 28 to MP 30). Farther to the south, the variation would cross a migration route for sheep between the McCullough Range and the River Mountains MP 32) and another migration path between the Highland Range and the Eldorado Mountains near the southern end of this variation at about MP 53.

The East Las Vegas Variation would cross feral horse range just east of the McCullough Range south of Las Vegas (MP 32 to MP 44).

The state listed desert tortoise could be affected over the entire length of this variation.

## Soils

The East Las Vegas Variation would most strongly affect 17 miles of Soil Group 5 and 59 miles of Soil Group 9.

Refer to the discussion of the proposed action in this chapter and table 3-9 for additional soil information.

## Visual Resources

The East Las Vegas Variation would lie entirely within the Basin and Range physiographic province. The landform is predominantly a flat broad desert landscape with occasional transitional slopes and steep mountainous areas. Vegetation consists of the typical hot desert species of creosote bush growing in a sparse, well-spaced pattern, with occasional Joshua trees and cacti. Cultural modifications include the urbanized areas of Las Vegas and Henderson, Nevada, a number of Federal and state highways, high voltage transmission lines, and other utilities. Table 3-37 more explicitly describes areas which would be affected. (See table 3-11 for a summary of the total number of miles and acres for each VRM Class which would be crossed by the variation.)

TABLE 3-37

AFFECTED ENVIRONMENT FOR VISUAL RESOURCES: EAST LAS VEGAS VARIATION

| MP | VRM Class and/ or VQO[2] | Description |
|---|---|---|
| **Pipeline**[1] | | |
| MP 3-MP 8 | 2 | Landform is a flat desert covered with a sparse pattern of creosote bush. The variation would cross the Las Vegas Dunes Recreation Area established by the BLM. |
| MP 27-MP 42 | 2 | The flat to gently rolling terrain is vegetated with creosote bush and is located within the proposed McCullough Mountain National Natural Landmark (HCRS). The northern portion is near an established housing subdivision, and high voltage transmission lines cross the southern portion. The area is viewed from U.S. Highways 95 and 93 and the urbanized area of Henderson. |
| **Ancillary Facilities**[3] | | |

[1]Only those segments which would be significantly affected by the East Las Vegas Variation are described.

[2]Refer to table 3-10 for definitions of terms.

[3]The ancillary facilities would not significantly affect the visual resource.

## Land Uses: Recreation Resources

The East Las Vegas Variation would cross the heart of the Las Vegas Sand Dunes Recreation Land (MP 3 to MP 8). This BLM-designated area is the annual site of nearly 30 ORV events, as well as typical free play ORV activity. The variation would also cross a popular spectator vista used to view ORV events, including the Mint 400 ORV event. (See 'Proposed Action' for more information on the Mint 400 event.)

## Cultural Resources

The East Las Vegas Variation would traverse the Las Vegas Wash. A long cultural sequence and high site density have been recorded in this area. The variation would pass near the Big Spring site on the National Register of Historic Places.

## Geology and Topography

In a 50-year period, about 37 miles of this variation would be expected to experience no more than 4 percent g, the remainder no more than 10 percent g. No fault hazard, liquefaction hazard, or landslide hazard is present. The only potential volcanic hazard would be ash fall.

This 59-mile long variation would be 3 miles longer than the section of proposed route (MP 488 to MP 544) it would replace. It would also cross somewhat gentler terrain. However, neither route would experience significant topographic constraints on construction.

## Water Resources

The East Las Vegas Variation would cross two intermittent streams and no perennial streams.

# VARIATION 4--FORT MOJAVE VARIATION

## Vegetation

The Fort Mojave Variation would traverse 10 miles of creosote bush vegetation, including numerous scattered Joshua trees and cacti. The miles of this vegetation type which would be affected are summarized in table 3-1 and located on map S-24. These areas are used largely for recreation, wildlife habitat, and livestock grazing.

## Wildlife

### STATE LISTED SPECIES

This variation would cross habitat of the desert tortoise, a state-listed species, throughout its entire length of 10 miles. Densities of tortoises in this area are an estimated 50 to 100 per square mile.

## Soils

The Fort Mojave Variation would most strongly affect the following soil groups: 2 miles of Soil Group 2, 1 mile of Soil Group 4, 9 miles of Soil Group 6, 2 miles of Soil Group 8, and 10 miles of Soil Group 9.

Refer to the discussion of the proposed action in this chapter and table 3-9 for additional soil information.

## Cultural Resources

This variation would traverse the edge of the Dead Mountains. Native Americans of the Mohave, Chemehuevi, and Quechan (Yuma) Indian tribes had prehistoric and historic use rights and religious traditions attached to this area. These tribal groups are today represented by descendents living on the Fort Mojave Indian Reservation, the Colorado River Indian Reservation, the Chemehuevi Indian Reservation, and locations off the reservation as well. Avikwamme (Mt. Newberry) at the north end of the Dead Mountains is the single, most important mythical location in all Mojave religion; it is also considered sacred by the Chemehuevi and Quechan. A report detailing the ethnography of this area is included as an appendix to the *Cultural Resources Technical Report* (Museum of Northern Arizona 1981).

## Water Resources

The Fort Mojave Variation would cross one intermittent stream and no perennial streams.

# VARIATION 5--MILL CREEK VARIATION

## Vegetation

The Mill Creek Variation would traverse 2 miles of forest vegetation, 13 miles of mountain brush, 2 miles of sagebrush, and 4 miles of pinyon-juniper. Miles of each vegetation type that would be affected are identified in table 3-1 and located on map S-24. These areas are used largely for recreation, wildlife habitat, livestock grazing, and transportation corridors.

## Wildlife

Deer winter ranges would be crossed by the Mill Creek Variation throughout its entire length of 21 miles from where it left the proposed action (MP 156) until it rejoined the proposed action (MP 169). Some waterfowl habitat would be crossed by this variation between about MP 3 and MP 7 and 10-13 for a total of 7 miles.

## Soils

The Mill Creek Variation would traverse 21 miles of Soil Group 1, which would be most strongly affected by project activities. Refer to the discussion of the proposed action in this chapter and table 3-9 for additional soil information.

## Visual Resources

The Mill Creek Variation would lie entirely within the Colorado Plateaus physiographic province. The physical characteristics which distinguish this mountainous region from other neighboring provinces is evidenced by the description in table 3-38. Only that segment of the route which would place a significant impact on the landscape is narrated. (See table 3-11 for a summary of the total number of miles and acres for each VRM Class which would be crossed by the variation.)

TABLE 3-38

AFFECTED ENVIRONMENT FOR VISUAL RESOURCES: MILL CREEK VARIATION

| MP | VRM Class and/ or VQO[2] | Description |
|---|---|---|
| **Pipeline**[1] | | |
| MP 0-MP 6 | 2 | Landform consists of a steep, confined canyon. Vegetation is chiefly sagebrush, with juniper on the upper slopes. The canyon is presently dominated by Soldier Creek, U.S. Highway 6/50, a railroad, and utility lines. |
| **Ancillary Facilities**[3] | | |

[1]Only those segments which would be significantly affected by the Mill Creek Variation are described.

[2]Refer to table 3-10 for definitions of terms.

[3]The ancillary facilities would not significantly affect the visual resource.

NOTE: The total affected visual resources of this variation would replace the proposed action between MP 156 and MP 169.

## Geology and Topography

The last 0.3 mile of this variation could experience fault rupture. The expected peak ground motion for the whole variation is 10 to 20 percent g. There is no significant potential for liquefaction or volcanic hazards other than ash fall. Moderate potential for landsliding exists for about 8 miles south of MP 13.

This 21.4-mile long variation would replace MP 155.7 to MP 168.7 of the proposed route. The northernmost 5 miles would extend east along Soldier Creek, remaining at an elevation of between 5,800 and 6,400 feet.

Along Soldier Creek, congestion and sidehill conditions would make construction difficult. The rest of the variation, although in rough terrain, would be generally easier to in construct the proposed route, especially if the existing road along Dairy Fork, West Lake Fork, and Little Clear Creek could not be used for the RMPP.

## Water Resources

The Mill Creek Variation would cross one intermittent stream and no perennial streams.

# VARIATION 6--DANIELS CANYON VARIATION

## Vegetation

The Daniels Canyon Variation would traverse 12 miles of forest vegetation types, 16 miles of mountain brush, 9 miles of sagebrush, and 9 miles of pinyon-juniper. Miles of each vegetation type that would be affected are identified in table 3-1 and located on map S-24. These areas are used largely for recreation, wildlife habitat, livestock grazing, and forest products.

## Wildlife

Deer winter ranges would be found along this variation from about MP 12 south of Heber City to a point near MP 24 on Daniels Pass. Another small area of winter range would be encountered from about First Water Creek southwest about 5 miles to near Narrows Siding (MP 47 to MP 52).

Sage grouse habitat encountered by this variation would occur only from the northern end of Strawberry Valley south to about Fifth Water Ridge (MP 30 to MP 38). Some waterfowl habitat would be crossed by the Daniels Canyon Variation along the western shoreline of Strawberry Reservoir (MP 28 to MP 36). Waterfowl habitat is crossed by this variation from about MP 27 to MP 36 for an estimated total of 9 miles.

## Soils

The Daniels Canyon Variation would most strongly affect 46 miles of Soil Group 1. Refer to the discussion of the proposed action in this chapter and table 3-9 for additional soil information.

## Visual Resources

The Daniels Canyon Variation would lie entirely within the Colorado Plateaus physiographic province. The physical characteristics which distinguish this mountainous region, with intermingled narrow valleys and rugged slopes from adjacent physiographic provinces, are illustrated in table 3-39. Only those segments of the variation which would place significant impacts on the visual landscape are narrated. (See table 3-11 for a summary of the total number of miles and acres for each VRM Class and VQO which would be crossed by the variation.)

TABLE 3-39

AFFECTED ENVIRONMENT FOR VISUAL RESOURCES: DANIELS CANYON VARIATION

| MP | VRM Class and/ or VQO[2] | Description |
|---|---|---|
| **Pipeline[1]** | | |
| MP 5-MP 6 | 2 | Where the variation would enter the Uinta National Forest, the terrain becomes transitional slopes covered with sagebrush and juniper. The generally unmodified area is seen from Heber City and vicinity. |
| MP 11-30 | 2,R | The alternative would be located within the steep, confined walls of Daniels Canyon. Vegetation consists of scattered juniper and sagebrush. U.S. Highway 40, fences, and utility lines would be along the corridor. Daniels Creek has excellent trout fishing. |
| MP 30-MP 38 | R | Landform consists of gently rolling, dissected slopes. Sagebrush is the predominant vegetation. The variation would follow the road along the west side of the Strawberry Reservoir. A number of existing and proposed recreation sites are located in this portion of the intensive recreation region. |
| MP 50-MP 52(END) | R | Where the variation would tie back to the proposed action, it would encounter steep transitional slopes. Vegetation consists of aspen and mountain brush, with juniper and sagebrush at the south end. The area is seen from an FS road which is the southern access to Strawberry Reservoir. |
| **Ancillary Facilities[3]** | | |

[1]Only those segments which would be significantly affected by the Daniels Canyon Variation are described.

[2]Refer to table 3-10 for definitions of terms.

[3]The ancillary facilities would not significantly affect the visual resource.

NOTE: The visual resources which would be affected by this variation would replace the proposed action between MP 108 and MP 156.

## Land Uses: Recreation Resources and Agriculture

### RECREATION RESOURCES

The Daniels Canyon Variation would pass through Daniels Canyon and the Strawberry Reservoir Recreation Area. Recreational sightseeing in Daniels Canyon (approximately between MP 10 and MP 28) is common along U.S. Highway 40 throughout the entire year, especially during the spring and early fall. Daniels Creek, which is adjacent to the highway, also provides trout fishing opportunities for planted trout. Some small game hunting and deer hunting takes place within the canyon area in late September and early October of each year.

The variation would follow the alignment of the Strawberry Reservoir west shore road (Forest Road #71031) approximately between MP 28 and MP 36. At the intersection of U.S. Highway 40 and Forest Road 71031, a Strawberry Reservoir Visitor Center is planned. The west shore road provides main access into several recreational facilities (e.g., campgrounds, boat ramps, picnic, and other day-use areas, etc.), as well as several summer lodges which are under a special use permit system by the FS. (See map 3-2), 'Recommended Plan (Strawberry Reservoir Enlargement - 1978.') The west shore road allows several scenic overlooks of the entire reservoir. The Strawberry Reservoir is a popular fishing area in Utah.

### AGRICULTURE

The Daniels Canyon Variation would traverse approximately 6 miles of mainly irrigated cropland in the Heber Valley area. (See table 3-12 areas).

## Geology and Topography

This entire variation would be subject to an expected ground motion of 10 to 20 percent g; however, no active faults would be crossed. No significant liquefaction hazard and no volcanic hazards are present along this variation. Landslide hazard exists between MP 37.5 and MP 43.5 and from MP 46.5 to MP 49.

The 52-mile long Daniels Canyon Variation would replace MP 107.9 to MP 155.5 of the proposed route. It would follow Daniels Canyon to Daniels Pass (MP 25), elevation 8,000 feet, and follow U.S. Route 40 to the north end of Strawberry Reservoir. Difficult sidehill construction would be necessary for about 10 miles in the canyon.

## Water Resources

The Daniels Canyon Variation would cross two intermittent streams and five perennial streams.

# Chapter 4
# Environmental Consequences

The environmental consequences are those impacts resulting from implementing the proposed action or any of the alternatives or variations. The environment that would be affected (affected environment) is discussed in its current state in chapter 3.

## Mitigating Measures

Impact analysis in this chapter is based on the assumption that mitigation would alleviate or minimize environmental impacts which would occur as a result of implementing the proposed action or any of the alternatives and variations. Measures which are proposed in order to achieve this for the RMPP are broken into five categories. The impact analysis assumes that the measures proposed by the applicant or required by Federal agencies on Federal lands would be implemented (the first four categories). Therefore, any impacts discussed in this document would occur after these measures were applied.

The first category of mitigation includes those measures automatically required by jurisdictional agencies as part of permits issued to the RMPC. These requirements are further discussed in 'Authorizing Actions and Permits' in appendix D.

The remaining categories of mitigating measures are discussed in appendix C. They include general mitigation (general construction and resource protection procedures) proposed by the applicant that apply to all lands that would be affected by the project; the Erosion Control, Revegetation, and Restoration Guidelines submitted by the RMPC for use on all lands that would be affected by the project; and the Erosion Control, Revegetation, and Restoration Guidelines for use on Federal lands which would be affected by the project. These Federal guidelines would become stipulations incorporated into the applicant's right-of-way grants. The final type of mitigation-- mitigating measures resulting from impact assessment--includes site-specific measures which would minimize or alleviate any impacts identified in chapter 4. These measures are intended as special stipulations to the applicant's permits; they would be enforceable only on Federal lands.

Impact assessment considered the construction, operation, and maintenance of the proposed project. All analyses assume a 100-foot wide construction right-of-way, as proposed by the applicant.

For the proposed action and the alternatives, the environmental consequences are discussed for the entire project, including the complete pipeline and any related facilities. Thus, impacts analyzed for the alternatives include any effects from implementing portions of the proposed action plus the alternative segments. For example, environmental consequences as a result of implementing Alternative B, the Sanpete Valley Alternative, are considered from MP 0 in Wyoming to MP 610 in California, with only MP 176 to MP 356 of the proposed action being replaced by the Sanpete Valley Alternative. Impacts of the entire project incorporating each alternative have been calculated.

Since the variations, which are relatively short, would not significantly change the impact of the total pipeline system, only the impact of the variations themselves is discussed. For example, the environmental consequences as a result of incorporating Variation 2, the Thistle Creek Variation, are discussed only for the segment that would differ from the proposed action, MP 156 to MP 176.

The detail of the impact discussion corresponds to the severity or degree of impact. Thus, significant impacts are discussed in detail; insignificant impacts are summarized in the EIS and discussed in detail only in supplementary material. Background information and analyses of impacts for some resources are contained in the technical reports and files. (To obtain copies of these documents, refer to the preface.)

## Significance Criteria

The following criteria were developed by the EIS team to determine the significance of impacts on each resource.

### VEGETATION

Impacts to vegetation due to removal of cover and surface disturbance would be significant if it would take more than 5 years following construction to reestablish preconstruction conditions. Impacts would also be significant if implementation of the proposed action, alternatives, or variations would allow poisonous or exotic plants to invade more

than 10 percent of a specific vegetation type along the right-of-way.

### WILDLIFE

Impacts to wildlife species would be significant if any crucial habitat (i.e., winter ranges, calving/ fawning areas, leks, brooding areas, etc.) was disturbed during the normal season of use. In addition, impacts would be significant if more than 1 percent of the total habitat available within a 1- mile wide corridor was disturbed.

### AQUATIC BIOLOGY

Downstream impacts to aquatic species would be significant if sediment from construction persisted in the flowing stream for more than 8 hours and occurred within 2,000 feet of spawning areas. Spawning areas would be significantly affected if they are crossed by the pipeline trench.

### THREATENED OR ENDANGERED SPECIES

Impacts to threatened or endangered species would be significant if the biological assessment required for the project finds that a species is in a *may affect* category. The biological assessment is being prepared. The FWS will respond with a biological opinion which will be incorporated into the final EIS.

### SOILS

Impacts to soils from expected increases in erosion rates and reduction of soil productivity (as a result of soil disturbance and alteration caused by construction of the proposed action, alternatives, or variations) would be significant if the loss of soil and reduction of soil productivity would prevent successful restoration and recovery to near preconstruction conditions.

### VISUAL RESOURCES

Impacts would be significant if modification in the landform and vegetation or the addition of a structure would not meet the standards of the VRM Class or VQO in which the portion of the project would be located. The Contrast Rating System, which analyzes contrast in form, line, color, and texture of the landscape and the duration before the impact would be reduced to an acceptable condition (discussed in further detail in appendix I) was used to determine significance.

### RECREATION RESOURCES

Impacts as a result of implementing the proposed action or any of the alternatives or variations would be significant if either or both of the following criteria were to be met:

> If the public's short term sensitivity and perceived concerns from construction through one recreation season beyond completion of construction would be high (thereby diminishing the quality of recreation experiences).
>
> If the public's long term (1 year through the life of the project, 20 years) sensitivity and perceived concerns would be medium to high (where the quality of the recreation experience would fail expectations).

Short-term or long-term impacts to recreation experiences of little public concern (such as an area not regularly used or dispersed recreation areas with ample space) would be insignificant.

### WILDERNESS

Impacts would be significant if any components of the proposed action, alternatives, or variations would cross the boundary of a Wilderness Area, a BLM WSA, an FS second Roadless Area Review and Evaluation unit (RARE II) recommended either for wilderness designation or a further planning area, or a proposed or existing state wilderness area.

### TRANSPORTATION NETWORKS

Impacts would be significant if the traffic increase, particularly over the long term, would cause an instability of traffic flow, noticeable congestion, and/ or a substantial increase in average travel time. Traffic delays of more than 60 minutes during low-use periods and more than 30 minutes during normal traffic flow would be significant. Impacts would also be significant if there would be any permanent impact to roads or rail networks, other pipeline systems, or electrical power transmission systems.

### AGRICULTURE

Impacts to agricultural lands would be significant if more than 5 acres of land would be irreversibly converted to other uses (as a result of placing permanent facilities) or if the viability of any of the lands would be significantly diminished by the project.

## LIVESTOCK GRAZING

Impacts would be significant if the forage quantities lost as a result of constructing the proposed action, alternatives, or variations would reduce livestock stocking on the pastures which would be crossed by the pipeline.

## FORESTRY RESOURCES

There are two types of forest resources--commercial timber and fuelwood. Impacts to commercial timber would be significant if conifers lost or cut prematurely as a result of clearing the right-of-way exceeded 1 percent of the annual timber harvest for a particular national forest. Aspen is currently considered only as fuelwood, although it will continue to gain importance for pulp and paper markets, and thus will eventually be considered commercial timber.

Currently, pinyon-juniper, aspen, and oak (including oak/brush) are used for fuelwood. Loss or premature cutting of these would be significant if it were to exceed 1 percent of the total resource in a national forest or BLM district. Future demands (for the next 10 years) could change the significance criteria to less than 1 percent.

## CONFLICTS WITH LAND USE PLANS, POLICIES, AND CONTROLS

All known conflicts with land use constraints prescribed by legislative, regulatory, or planning processes of local, state, and Federal governments are identified.

## SOCIOECONOMICS

Impacts would be significant if they would exceed the following criteria:

- Demand for permanent or temporary housing exceeding 10 percent of the existing vacancies.
- Permanent demand on other infrastructures greater than 10 percent of the current level of demand, temporary demand exhausting the excess capacity in the areas where the crews would live, or a change in local tax revenues greater than 10 percent.
- An increase in total employment greater than 5 percent or an increase in retail sales greater than 15 percent.

## NATIVE AMERICAN ISSUES

Impacts to Native Americans would be significant if the proposed action or any of the alternatives or variations would pass through more than 2.5 miles of a reservation, would hire Native Americans for labor, or would contribute revenues to the reservation from right-of-way income.

## CULTURAL RESOURCES

Impacts to cultural resources would be significant if an historical or archaeological property included on or eligible for inclusion on the National Register of Historic Places would be altered, damaged, or destroyed by the proposed action or any of the alternatives or variations.

## GEOLOGY AND TOPOGRAPHY

Geological impacts would be significant if extensive subsurface disturbance would occur as a result of implementing the proposed action, alternatives, or variations. Topographic impacts would be significant if major, long-term changes to the topography would be necessary to construct the proposed action, alternatives, or variations.

## WATER RESOURCES

### Ground Water

Impacts would be significant if deep excavations would be required, thus affecting deep ground water reservoirs.

### Surface Water

Impacts to streams would be significant if construction-induced sediment smothered downstream aquatic life and spawning areas. Impacts would also be significant if construction-induced contaminants (lubricants and fuels) reached levels lethal to aquatic life.

### Floodplains

Impacts would be significant if aboveground permanent facilities would be located on any 100-year floodplains.

### NOISE QUALITY

Impacts would be significant if estimated noise emissions from compressor stations exceeded a day-night sound pressure level average of 55 dB(A) at the nearest residence.

### AIR QUALITY

Impacts to air quality would be significant if they met one of the following criteria:

Emissions for any criteria pollutant exceeded 250 tons per year at any new compressor station.

Estimated emissions from expansion of existing compressor stations exceeded 100 tons per year of CO, 40 tons per year of $NO_2$, 40 tons per year of $SO_2$, or 25 tons per year of TSP.

Predicted ambient pollutant concentrations exceeded the NAAQS at any of the expanded or proposed compressor stations.

### PIPELINE SAFETY (RUPTURES AND EXPLOSIONS)

Impacts would be significant if the RMPP, alternatives, or variations were located on known active faults in populated areas with a reasonably high probability that earthquakes could induce a rupture. Impacts would also be significant if the pipeline were located on any known landslides in populated areas where special construction measures would not be sufficient to reduce potential risk from ruptures caused by landslides.

## Insignificant Impacts

To reduce repetition, insignificant impacts or impacts similar to those created by the proposed action are not discussed for each alternative or variation. Figure 3-1 identifies by resource and alternative how and why impacts are discussed in detail in chapter 3 and this chapter. The following resources would sustain insignificant impacts from at least some of the alternatives and variations, as well as from the proposed action.

### VEGETATION

Invasion of poisonous or exotic plants would be insignificant as long as the Erosion Control, Revegetation, and Restoration Guidelines are implemented.

### AQUATIC BIOLOGY

For a linear project such as the proposed pipeline, the impacts to aquatic biology would be short term, minor, and insignificant.

At stream crossings, removal of streambank vegetation for a 100-foot wide construction right-of-way would not open the shade canopy sufficiently to affect the water temperature and quality. Calculations made for the water resources analysis show that sediment would be transported only a short distance downstream. This would not be extensive enough to harm aquatic life. Routes paralleling streams would not be expected to parallel them close enough to cause earth to spill into the streams. Therefore, no impacts to aquatic biology are discussed for the proposed action or any of the alternatives or variations.

### VISUAL RESOURCES

Insignificant impacts to visual resources, both long and short term, would result from implementing Variation 4, the Fort Mojave Variation; therefore, visual resource impacts are not discussed for Variation 4. To review the affected visual resources of the portion of the proposed action that would be replaced, refer to the description of MP 584 through MP 594 of the proposed action.

### RECREATION RESOURCES

The proposed action and all alternatives and variations would have some insignificant impacts to the recreation resource. These include minor, short term construction impacts such as dust, noise, and visual intrusions on recreational experiences. These insignificant impacts would result from implementing Alternative A, Alternative C, Alternative F, and Variations 2, 3, 4, and 5. Impacts which would result from alternatives B and D would be similar to the proposed action. Therefore, impacts to recreation are not discussed for Alternatives A, B, C, D and F, nor Variations 2, 3, 4, and 5.

### WILDERNESS

No designated or proposed wilderness areas would be crossed by any components of the proposed action, alternatives, or variations, except for Alternative C, the Central Nevada Alternative. This evaluation includes Wilderness Areas, and WSA's designated by BLM, units from RARE II and further planning designated by the FS, and any proposed or existing state wilderness areas.

Some minor short term construction impacts such as noise, dust, and visual intrusions would occur to lands along the boundary of a WSA along Variation 4.

However, these impacts would be insignificant. Therefore, impacts to the wilderness resource are not discussed for the proposed action; Alternatives A, B, D, E, and F; nor Variations 2 through 6.

## TRANSPORTATION NETWORKS

Disruptions to railroads, other pipeline systems, and electrical power transmission systems would not occur as a result of the proposed action, alternatives, or variations. Construction of the proposed action, alternatives, or variations would create minor traffic disruptions due to slow moving equipment or one lane closings. An unquantifiable amount of minor road deterioration might also occur.

In addition, the proposed action, Alternatives C, E, and F, and Variations 2 and 6 would cause minor traffic disruptions on roads in canyons which they would parallel. Traffic could be disrupted from 5 to 30 minutes along the canyons. At a maximum, the state highway departments would allow canyon highway closings for only short durations during blasting, probably for no more than 30 to 60 minutes during low-use periods of the day (West 1981). Such road closures could take place along the proposed action and Central Nevada Alternative in canyon areas; the Provo Canyon Alternative in Provo Canyon; the West Salt Lake Alternative in Emigration, Williams, and Strawberry Canyons; the Thistle Creek Variation in Thistle Creek Canyon; and the Daniels Variation in Daniels Canyon.

Because traffic disruptions are considered insignificant, this resource is not described further in the EIS.

## LIVESTOCK GRAZING

Loss to livestock grazing capacity (measured in animal unit months (AUM's)) would generally be insignificant if the proposed action, alternatives, or variations were implemented. More significant impacts could occur in some areas where rehabilitation would be more difficult and erosion control structures would interfere with normal livestock use. Refer to appendix J for more details and for the amounts of AUM's which could be lost due to pipeline construction.

## FORESTRY RESOURCES

Quantities of wood products that would be affected by the proposed action, alternatives, or variations would be small and insignificant when compared to the total wooded areas. In addition, the applicant would pay fair market value for all timber lost. Appendix K and the comparative analysis in chapter 2 identify the board feet, cords of wood, and values of wood that would be affected by the proposed action, alternatives, and variations.

## NATIVE AMERICAN ISSUES

Alternative C and Variations 2 through 6 would not pass across any reservation lands; thus, they would not significantly affect Native Americans. Variation 4, the Fort Mojave Variation, would pass near the Fort Mojave Indian Reservation and could therefore increase employment within the tribe as would the proposed action. Although Alternative A, the Northern Systems Alternative, would cross the Fort Hall Indian Reservation, no significant impacts would occur. Impacts from Alternatives B, D, E, and F would be similar to those from the proposed action. Therefore, impacts to Native Americans are not discussed for any of the alternatives or variations.

## GEOLOGY AND TOPOGRAPHY

Because the proposed action, alternatives, and variations would cause little subsurface disturbance, no significant disruptions to geologic formations would occur. Although various kinds of minerals may be present under some affected lands, implementation of the proposed action, alternatives, or variations would not preclude further development of these resources. Therefore, no geological or mineral withdrawal impacts are discussed.

The impact to topography as a result of constructing a pipeline would generally be minor and short term; consequently, little description of topography is provided. Areas where topography would impose severe construction constraints are identified.

Existing topographical environment and impacts to it are briefly discussed, except for the Fort Mojave Variation, which would be similar to the proposed action. Because the Sevier-Escalante Desert Alternative and East Las Vegas Variation would require no sidehill construction, they also have not been discussed.

Potential erosion impact is discussed in 'Soils.' Visual impact as a result of scars on the landscape is discussed in 'Visual Resources.'

### WATER RESOURCES: GROUND WATER AND WETLANDS

Executive Order 11988 requires that Federal agencies make every effort to avoid locating aboveground structures in 100-year floodplains. This is to avoid damage to property and ecological harm to the floodplains. No aboveground permanent structures would be constructed within a 100-year floodplain; therefore, no property damage from such a flood would result to them. The pipeline would be buried in the 100-year floodplain at each stream crossing. However, since existing regulations require that the proposed pipeline be buried below the maximum scour depth, there would be no effects at flood stage.

The proposed action or various alternatives and variations would not cause deep subsurface disturbance, and no impacts would occur to ground water. Thus, no ground water impacts are discussed in the EIS. Impacts from constructing the pipeline across streams and wetlands would be of low significance. Numbers of stream crossings are given in chapter 3 for all routes, and impacts are described in chapter 4 for the proposed action. The *Water Resources Technical Report* lists stream crossings. Executive Order 11990 requires consideration of wetlands, thus when a stream requires a COE section 404 permit, FWS considers the stream and its wetland area in light of the Executive Order mandates.

Executive Order 11988 requires that Federal agencies make every effort to avoid locating aboveground structures in 100-year floodplains. Since no aboveground permanent structures would be constructed within a 100-year floodplain, no property damage from such a flood would result. The pipeline would be buried in the 100-year floodplain at each stream crossing. However, since existing regulations require that the proposed pipeline be buried below the maximum scour depth, there would be no effects at flood stage.

### AIR QUALITY

No significant long-term impact should result from construction; only temporary violations could occur. Impacts from Alternatives B, D, and F, and all variations would be similar to those which would result from the proposed action, therefore are not discussed.

### URBAN CONFLICTS

An area which is not treated separately because it is shared by alternatives and variations and because it occurs with construction of any pipeline system is the impact to urban areas and small rural towns. RMPC would have to negotiate rehabilitation and reimbursement terms with all landowners who would be affected by the pipeline. For the proposed action, this would be required primarily for a few small towns along the right-of- way; more extensive negotiations would be necessary in the Las Vegas area. Alternatives C, D, and E would also affect small rural towns, with a concentration around Delta, Utah. Alternative B would encounter more small towns than the proposed action, thus requiring more coordination by the applicant. Alternative F would require more extensive right-of-way negotiations because the right-of-way would pass through several housing and industrial areas in the Provo, Utah, vicinity. Variation 3 would pass through the Las Vegas area, but it would generally follow gaps in the urban areas left by other transportation projects. Alternative A would pass by a few small towns where some negotiations would be necessary. Variations 2, 4, 5, and 6 would require either few negotiations because they would affect few small towns or no differences from what would be required for the proposed action in those segments.

The remainder of this chapter discusses in detail impacts not excluded in figure 3-1. These impacts are compared in the 'Comparative Analysis of the Proposed Action, Alternatives and Variations' in chapter 2.

# PROPOSED ACTION

## Vegetation

### GENERAL IMPACTS

The EIS analyzes the impact of a full 100-foot width as proposed by the RMPC; this includes an up to 50-foot wide right-of-way, plus an up to 50-foot wide temporary permit construction area. However, on slopes of about 10 percent and less, some vegetation would probably not be removed. The 50-foot right-of-way may be cleared of vegetation, but the remaining 50 feet used for pipe assembly and equipment movement would only need sufficient scraping and clearing to provide working room, thus leaving roots and low plant crowns. See map S-24 in the *Graphic Supplement* for the acres of each vegetation type removed along the proposed route, alternatives, and variations.

**Forest** The applicant's construction procedures through forest vegetation would require that all trees within the construction right-of-way be re-

moved. No trees would be allowed to grow on an approximate 25-foot width over the pipeline. Therefore, only the understory and low growing shrubs less than 2 inches in diameter would vegetate this area for the life of the project (20 years). Grasses and forbs would reach their preconstruction dimensions within 1 to 5 years, while trees outside the pipeline area would require from 20 to 150 years to achieve preconstruction dimensions.

**Mountain Brush** Mountain brush vegetation would be removed from the width of the right-of-way. Species such as oak that grow larger than 2 inches in diameter would not be allowed to regrow within a 25-foot wide section immediately over the pipeline. Over the remainder of the right-of-way, brush would require 20 to 50 years to regrow to original dimensions.

**Sagebrush** Sagebrush would be removed to the extent that it would interfere with construction but would be allowed to revegetate over the entire right-of-way. Regrowth would require 10 to 25 years.

**Pinyon-Juniper** The applicant proposed to remove pinyon-juniper vegetation from the width of the right-of-way with trees restricted from growing on an approximately 25-foot wide section over the pipeline (as in the forested areas). Tree growth would require 100 years or more to attain preconstruction dimensions.

**Saltbush-Greasewood** Vegetation would be cleared only to facilitate construction activities, although construction equipment would break stems and crush vegetation within the construction right-of-way. Overstory vegetation would require from 20 to 40 years to grow to preconstruction dimensions.

**Creosote Bush** This vegetation would be removed only to facilitate construction, although construction equipment would most likely crush all vegetation within the right-of-way. Dry growing conditions associated with the species, would slow recovery of vegetation to preconstruction dimensions and density by 100 or more years.

**Riparian Vegetation** Riparian vegetation is associated with moist or wet areas and would be removed at stream crossings, as necessary. Growth would be restored within 1 to 5 years except for brush or tree species which would require from 10 to 25 years to grow to preconstruction dimensions. Trees over 2 inches in diameter would not be allowed to revegetate in the area directly over the pipeline.

**Annual Grass Vegetation** Annual grass and forb species called "Mediterranean Annuals" are found along the California segment of the Northern Systems Alternative. These species would reestablish ground cover to preconstruction densities within 1 year from disturbance.

**Barren Land** Barren land refers to the Great Salt Lake and other salt flats where very little vegetative cover is found except for sparse populations of highly salt-tolerant plants (including pickleweed). These generally occur around the edges of salt flats or in slightly elevated hummocks. After disturbance, the salt-tolerant plants will revegetate over a period of several years.

**Species of Environmental Concern** Joshua trees and several species of cacti, primarily associated with the creosote bush and saltbush-greasewood vegetative types, would be crushed or removed during construction activities. Regrowth could require 100 years or more. The unique stand of Rocky Mountain red cedar *Juniperus scopulorum* would be traversed and disturbed by the proposed route.

### Impacts of the Proposed Action

Granting a right-of-way for the proposed action would affect 6,330 acres of vegetation. Of this total acreage, the understory vegetation would return to preconstruction densities and reach stabilization within 5 years after construction if the Erosion Control, Revegetation and Restoration Guidelines proposed by the RMPC and the Erosion Control, Revegetation and Restoration Guidelines for Use on Federal Lands presented in appendix C were to be implemented. The overstory vegetation would require longer than 5 years to reestablish. Joshua trees and cacti scattered in 2,789 acres of creosote bush and saltbush-greasewood vegetation types could be affected, and 14 acres of riparian vegetation could be affected. See table 3-1 for acres of each vegetation type which could be disturbed.

The RMPC safety and inspection regulations and requirements do not allow trees or brush over 2 inches in diameter to revegetate on an approximate 25- foot wide strip directly over the pipeline. This would result in a loss of 573 acres of forest, mountain brush, and pinyon-juniper types along the proposed route for the life of the project (20 years).

## Wildlife

Impacts to animals, birds, reptiles, and amphibians that were examined included harassment, short and long term destruction of vegetation used for food and cover, temporary blockage of migration routes, and increases in illegal or random killing.

Background information supporting the impact analysis is contained in two technical reports for the RMPP: the *Terrestrial and Aquatic Biology Technical Report and Threatened and Endangered Species Technical Report* (BLM 1981d, BLM 1981e).

## MAMMALS

The proposed route would cross approximately 157 miles of critical big game winter range throughout its entire length. (Refer to table 3-3 for more detail.) Although the RMPC proposed to construct the pipeline between the months of May and October, if the schedule were to slip, animals on big game winter range could be affected. Impacts that could occur on these winter ranges include clearing vegetation (i.e., habitat and food) from the right-of- way, harassment of wintering big game animals due to human presence, and activities around the construction sites and harassment of wintering big game animals because of increased human access afforded by construction roads. Impacts to wintering big game animals would include losses caused by poaching and wildlife/vehicular accidents.

Vegetation removed from 157 miles of pipeline right-of-way would total an estimated 1,903 acres. This acreage would not be in one wintering area, so the impact of reduced winter forage to wintering big game animals would not be significant.

A significant impact to wintering big game animals would be the effect of harassment on animals already in stress situations. Harassment resulting from noise and people in the vicinity of construction could result in lowered animal reproduction. Energy expended by stressed animals to escape such harassment could cause weight losses which would result in lowered productivity (Preobrazhenskii 1961, Geist 1974). In extreme cases of weight loss, death of adult animals could also result (Geist 1974). The magnitude of these effects cannot reliably be estimated; however, they could result in significant reductions in young-of-the-year. These effects could be expected to occur to all species of big game animals wintering in areas which would be traversed by this pipeline route.

The proposed action would pass near eight desert bighorn sheep areas and would intersect approximately five sheep migration routes (as noted in table 3-4).

Harassment of desert bighorn sheep around water sources would result from construction workers camping or parking near these areas. From mid-May through mid-September, water is vital to the survival of these animals. Any activity within 2 miles of a water source (Janke 1980) may cause these animals to abandon the water source (Leslie and Douglas 1980) and move to other areas that may be less favored but are removed from human activity. Impacts caused by deprivation of water include dehydration and possible loss of young animals as well as resorption of embryos, both reducing the species production.

In addition to problems for wintering big game animals, other impacts caused by construction workers could include direct losses of animals caused by poaching and random killing, and possible increases in animal/automobile collisions due to increased traffic flow around construction sites. The increase in traffic volume cannot be quantified. There would be an increase for a short time, and animal/vehicular collisions could increase for that period.

Removing topsoil and storing it for later reclamation would kill small burrowing rodents. Losses due to these procedures as well as other pipeline construction activities would not only result in direct mortality but would also displace more mobile animals. However, since the reproductive rates of these animals are so high and population turnover is so rapid, large numbers (not quantifiable with present data) of these animals are produced and lost each year under natural conditions. The high reproductive potential and natural cyclic population fluctuations of these animals indicate that rapid repopulation in these disturbed areas would take place (BLM 1978a).

Destroying about 5,773 acres of brushland habitat (including mountain brush, sagebrush, pinyon-juniper, saltbush, greasewood, and creosote bush types) would kill an unquantifiable number of cottontail rabbits along the proposed action. While the magnitude of these losses would be significant, the high reproductive potential of these animals would enable them to repopulate the disturbed areas quickly after reclamation was complete.

## BIRDS

A large variety of small songbirds would be affected by the removal of brush, trees, and topsoil from the pipeline right-of-way. The best population density estimates currently available indicate that there are an average of 21 breeding pairs of small birds per 100 acres in the various vegetative types which would be found along the right-of-way. Populations of these small birds tend to average a complete population turnover every 3 years, with each nesting pair fledging an average of three young per nest (Schroeder 1981).

Reclamation plans propose to return the vegetation to perennial grasses, forbs, and shrubs. This change in vegetation could alter the species of the small bird population because habitat for brush-

loving species would not be present. However, since this is a linear project, no such impacts are anticipated.

Sage grouse are the major game bird to be encountered along the proposed route. The route would pass through or near (within 2 miles) an unknown number of leks (strutting grounds) and a total of about 33 miles of occupied sagebrush habitat (about 400 acres). Table 3-5 lists the milepost locations. Surveys for strutting ground locations have not been completed in many areas of Utah, but sage grouse strutting grounds are suspected to occur in many of these areas (Day 1981). Impacts to this ground-nesting species would include direct mortality to nesting hens, harassment of strutting males on the leks, disturbance of wintering flocks, and removal of sagebrush overstory upon which this species is virtually 100-percent dependent. All of these impacts would have the same result: a reduction in reproduction during the year the pipeline would be constructed. Harassment of strutting males on the leks would probably have the greatest impact on total production, since it would disrupt breeding activities. Actual mortality of nesting hens or destruction of nests on the pipeline right-of-way would be the second greatest impact. Sagebrush removal along the narrow right-of-way would have the least effect because only a small percentage of total available sagebrush would be removed along the route.

Impacts to Gambel's quail would be significant if pipeline construction occurred during the dry summer period from mid-May through mid-September and, in addition, if construction took place in nesting habitat within 2 miles of gallinaceous guzzlers. During the nesting season, along the drier southern portions of the proposed route, these birds concentrate their nesting activities within 2 miles of these guzzlers (Janke 1980). Construction disturbances could result in nest abandonment, thus reducing production, or, nesting hens could be killed and their nests destroyed by construction machinery.

Scattered populations of ring-necked pheasants might be affected by the proposed route near agricultural areas in northern and central Utah. Nesting hens could be affected directly by construction machinery, and nests could be destroyed if they were located within the staked pipeline right-of-way. These impacts could lead to a slight reduction in production during the year construction was undertaken. Because of the nature of pipeline disturbance in agricultural areas, no long term losses in pheasant production would be anticipated. If construction were to take place outside of the critical nesting period, impacts to pheasants probably would not occur.

There would be at least nine areas along the proposed route (see table 3- 7) that furnish nesting and hunting habitat for the many species of raptors. Nesting raptors are very susceptible to disturbance, and nest abandonment at any stage of incubation is very common if the birds are disturbed. Some of the species of raptors found in this area have a low population, and abandonment of nests would lower production for that year, thus maintaining the low population.

Any golden eagle nests found within 1 mile of the pipeline route would have to be protected from disturbances because of provisions of the Bald Eagle Act, which requires protection of the golden eagle and its nests. These large birds are quick to abandon their nests if disturbed; lowered production is the result. Once the right-of-way was staked, a survey would be made to determine the location of active golden eagle nests so that disturbances could be minimized. If construction did not occur during the critical nesting period, the only adverse impact which might occur would be illegal killing.

Waterfowl habitat would be crossed by this route for an estimated 34 miles (412 acres). The March 15 to June 15 period is the most critical time of year for these species. Disturbance of wetlands areas during this time of year could result in lowered production as there is not an abundance of waterfowl production areas along this route and any disturbance during the nesting period could reduce production for that year.

## AQUATIC SPECIES

According to the Utah Division of Wildlife Resources, no impacts to aquatic resources are anticipated at any of the stream crossings as long as management practices as defined in Title 33 CFR, 1980.ed., part 323 are followed (Nish 1981).

## REPTILES AND AMPHIBIANS

Reptile and amphibian numbers appear to be low in the area along the proposed route. There is some riparian vegetation and free water along the route which provide amphibian habitat. Reduction of riparian habitat could reduce populations of these animals. However, reproduction levels of these species are high enough so that repopulation would be rapid once reclamation was completed.

## FEDERAL LISTED SPECIES

Under provisions of the Endangered Species Act of 1973, impacts to federally listed species cannot be

allowed. If a biological assessment of the impact of a proposed project determines that the project may affect a particular listed species, formal section 7 consultation with the FWS is required. When the FWS receives the biological assessment, it will submit a biological opinion either confirming or refuting statements in the assessment. The opinion will include recommendations to alleviate impacts to threatened or endangered species. All recommendations contained in the opinion will be acted on by BLM.

### Desert Tortoise

The critical habitat designated in the southwestern corner of Utah (an estimated 24,960 acres) harbors only an estimated total population of 350 tortoises (Bender 1980). The proposed pipeline would cross within 3 miles of this population.

### Black-footed Ferret

Impacts to the black-footed ferret would include direct mortality to any ferrets hiding underground in the path of construction machinery. Both adult ferrets or any litters that might be present would be killed.

### Bald Eagles

Impacts to bald eagles should not occur because the proposed pipeline would be constructed during the summer when the birds are not present in the area. There are no known bald eagle nesting areas near the proposed route, so impacts to nesting eagles would not occur. Also, no known winter roost trees occur near any of the proposed stream crossings, so impacts to these important roost trees would not be anticipated.

## STATE LISTED SPECIES

The desert tortoise is protected by state laws in Nevada and California. Impacts to the tortoise would include direct mortality from crushing of burrows by heavy machinery, population reductions if construction workers illegally collect the animals, and possible mortality from tortoises falling into an open trench. Any of these impacts would significantly reduce an already low population.

# Soils

## GENERAL IMPACT

Proposed construction would alter and disturb soil within the pipeline right-of-way, at surface facility sites, and along access roads. These impacts would include disturbance of topsoil; soil compaction; disturbance of the desert pavement condition in the arid and desert areas; sidehill cuts in steep mountain slope areas; alterations of the soil profile along the excavated pipeline trench resulting in accelerated soil erosion; and reduction in soil productivity. These impacts would affect runoff, water erosion, sediment yield, wind erosion, and soil stability, as well as affect the soil as a medium for plant growth.

Impacts to soils would result primarily from an increased susceptibility to erosion or displacement. The degree of susceptibility to erosion would vary according to soil erodibility characteristics, topography, surface roughness, and the presence or absence of protective soil cover such as vegetation, plant residues, gravel cobble, or rock. The amount of erosion would be related to the time between the disturbance and reestablishment of vegetation or implementation of erosion control measures. Soil productivity could be reduced by either the loss of topsoil or the mixing of topsoil with substratum materials excavated from the trench that are high in salinity, alkalinity, other toxic materials, or unweathered parent materials.

Impacts on soils within the pipeline right-of-way would be generally insignificant and temporary if erosion control and revegetation of the disturbed areas were successful. With implementation of the Erosion Control Restoration, and Revegetation Guidelines outlined in appendix C, (to be added as a stipulation in the right-of-way grant), successful erosion control and reclamation should occur on all croplands and in areas of native vegetation where climatic and soil conditions are more favorable for plant growth.

Soil impact potential would be greater in areas with less favorable soil and climatic conditions where soils are more susceptible to erosion hazards and have a lower revegetation potential. Nine soil groups with properties considered most susceptible to impact are described in chapter 3 and identified and quantified in table 3-9. Intensive implementation of measures outlined in the Erosion Control, Revegetation, and Restoration Guidelines in appendix C would minimize soil impacts in areas more susceptible to impacts, returning erosion rates to near preconstruction levels generally within 1 to 5 years.

Final pipeline alignment would tend to avoid, where possible, highly erodible slopes and potential slide areas. This would reduce the potential for accelerated erosion and other impacts. A few small areas where adequate vegetation could not be established and maintained would require continuing erosion control measures. Effects of potential impacts to soils are discussed in more detail in the *Soils and Agriculture Technical Report* (BLM 1981).

## IMPACTS OF THE PROPOSED ACTION

The proposed action would disturb a total of 7,395 acres of soils. The soils with greater impact potential total 3,056 acres and are discussed in the following sections:

### Soil Group 1

In Soil Group 1, 1,382 acres would be disturbed by construction. This would be one of the main soil groups affected by pipeline construction. These shallow to deep soils on the steep sloping mountain areas which receive an annual precipitation of 14 inches or more have specific locations susceptible to poor slope stability and high erosion hazards. Sidehill cuts and fills would cause structural soil changes resulting in mass movement, slides, an increase in surface disturbance, and soil erosion. A more detailed review indicates approximately 10 to 30 percent of the areas would be subject to slides. These soils occur from MP 65 to MP 79, MP 80 to MP 170, and MP 176 to MP 192. Areas of Soil Group 1 are identified on maps S-2 through S-19 in the *Graphic Supplement*. No other soil groups are shown on the base maps.

In addition to slope, properties of the underlying geologic formation would also strongly influence impacts from project construction. The Green River and Uinta formations are unstable formations, and the soils derived from them inherit properties and behavorial characteristics that adversely affect revegetation potential.

A preconstruction field review to determine final pipeline alignment and site-specific mitigation measures proposed by the applicant and required by the authorizing agencies (identified in appendix C), would reduce the potential high impacts in the mountain soil areas.

### Soil Group 2

Construction would disturb 170 acres of Soil Group 2. These shallow to deep, moderately steep to steep soils of the mountains and plateaus in areas with annual precipitation of 14 inches and less are subject to moderate to high erosion hazards and low revegetation potential.

### Soil Group 3

There would be 436 acres of Soil Group 3 disturbed by construction. These strongly saline and alkaline soils would cause erosion and revegetation problems. Most commonly, these areas are sparsely vegetated and have a low revegetation potential. However, soil losses due to project construction would be minimal, considering the nearly level to gentle slope, areas, the preconstruction vegetation cover condition, and limited erosion.

### Soil Group 4

Sixty-one acres of sandy and loamy sand soils in areas with an annual precipitation of less than 16 inches would be disturbed. These soils have a low revegetation potential and are highly susceptible to accelerated wind erosion. Wind erosion would cause air pollution from fugitive dust until stabilization by mulches and other special erosion control treatments was achieved.

### Soil Group 5

Construction would disturb 570 acres of Soil Group 5, consisting dominantly of shallow soils over bedrock and soils with duripans and hardpans. These soils have a low vegetation density and revegetation potential. The effects of disturbance would be minimized in less than 3 years after restoration measures were applied.

### Soil Group 6

Construction would disturb 206 acres of Soil Group 6. These soils occur on side slopes, ridges, and fans with slopes of 15 to 25 percent (including some areas of 9- to 15-percent slope) but, this does not include mountain soils. These soils are susceptible to a high erosion hazard and are more difficult to reclaim. Intensive application of erosion control and reclamation measures (appendix C) would limit erosion loss to near preconstruction levels.

### Soil Group 7

Construction activities would disturb 61 acres of playas, Soil Group 7. Physical and chemical properties of these soils would strongly affect construction

and maintenance of the project. Erosion hazard would be slight; runoff would be slow or ponded.

### Soil Group 8

Construction of the pipeline would disturb 170 acres of rock land and barren land, Soil Group 8, subject to high sediment yield and gully erosion. Rockland areas would require special construction techniques such as blasting.

### Soil Group 9

There would be 2,811 acres of Soil Group 9 disturbed by construction activities. These areas with annual precipitation less than 8 to 10 inches are more susceptible to erosion and would require more intensive application of restoration measures to attain preconstruction conditions due to the low revegetation potential and disturbance of desert pavement surfaces. The baseline condition of these areas is sparse; vegetation consists mainly of shrubs and forbs. Reseeding is more difficult and generally not successful. Intensive application of mitigation measures (appendix C) would reduce accelerated erosion and would prevent rills and gullying along the steeper slopes along the right-of-way which could result from short, intense rain storms characteristic of this climate.

Soil impact potential would be similar for the alternatives and variations, since they generally would traverse similar soil conditions. As table 3-9 indicates, the alternatives and variations differ mainly in the extent and occurrence of soil types they would cross.

## Visual Resources

### CRITERIA FOR ANALYSIS

The impact of the contrasts which could be observed in the landscape as a result of implementing the RMPP are based on the BLM VRM System and FS VQO's (BLM 1978b). Refer to appendix I, 'Visual Resource Management,' and the *Visual Resources Technical Report* for further explanation (BLM, 1981g). A contrast rating was determined by evaluating the extent to which construction of the proposed action, alternatives, and variations would contrast with the form, line, color, and texture of the existing landscape. The extent of contrast was then translated into either adverse or beneficial impacts.

The basis for applying the contrast rating was the VRM Classes and VQO's described in chapter 3. Potential areas of impact and typical viewing points along the routes and near ancillary facilities were determined based upon scenic quality or visual variety of the landscape, visual sensitivity, and viewing distance.

The duration of viewing, number of viewers, viewer attitude toward changes in the landscape, angle of observation, ease of recontouring and revegetation, and construction and restoration methods (discussed in chapter 2 and appendix C) were all considered in analyzing the degree of contrast. Cumulative development was considered where further development would heighten contrast from existing rights-of-way for utilities and highways in narrow canyon areas. The impact of other proposed projects was also considered.

The contrast evaluation was concerned only with the residual effects of construction such as surface scars, removal of vegetation, and placement of permanent structures in viewed areas. All other impacts were considered insignificant because construction crews and equipment would be visible only temporarily and would not place significant impact on the visual resources of any area. Pipeline and ancillary facility operation, maintenance, and abandonment would have little or no adverse effect on the visual landscape.

The length of time the impact could be viewed was assessed in determining the contrast rating for the various VRM Classes and VQO's. Changes directly related to vegetation that would be mitigated through revegetation, as described for the proposed action, and within one or two growing seasons (e.g., cropland or areas of natural grasses) were considered to be temporary and, thus insignificant. The same rationale applies to landforms which would be recontoured during construction or immediately upon completion; these changes would be temporary and insignificant. In other areas which would not recover easily, significant visual contrasts would remain longer. These would include steep, rocky areas where landform changes would remain longer and steep, dry slopes or any areas of low precipitation where revegetation would be difficult. Modifications which would be noticeable for 2 to 5 years would be short term; those that would be noticeable from 5 years through the project life of 20 years or longer would be long term. Long term contrasts created by vegetative clearing limits for the RMPP facilities and the addition of structures would be the predominant adverse impact of the pipeline.

The distinct pattern of shrub types such as sagebrush, creosote bush, and shadscale-greasewood would be easily affected by the straight lines created by the right-of-way clearing technique. Be-

cause of the regenerative nature of these species coupled with poor growing conditions, such impacts would generally be long term. The VRM Class or VQO where the change would occur determine final significance. Revegetation would produce color contrast with existing vegetation, emphasizing the contrast in line.

Visual impacts which would be directly related to the addition of physical structures (ancillary facilities) to the landscape would be significant only if they contrasted with the natural setting determined by the contrast rating system. Such structural impacts would be limited to compressor stations and maintenance yards, where cleared vegetation and the scale and design configuration of the facilities would make them highly visible; the resulting visual contrasts would detract from the natural landscape setting. Block valves, access roads, and cathodic protection stations would place equal impacts on all routes analyzed; these impacts would be insignificant because of the facilities' relatively small size and scale within the landscape. Further analysis would be necessary during the permit granting and monitoring to minimize visual impact on Federal lands.

Communication sites were not analyzed since the numbers of sites and their locations have not been determined. While the RMPC indicates that a majority of the project's communications needs can be met by using existing systems, new facilities might create significant adverse visual contrasts in areas where they would be placed. (Communication towers are normally located on higher landforms where they may be seen from many viewing points.) Additionally, the landforms in these areas are usually of higher scenic value, which contributes toward classifying the areas in a more restrictive VRM class or VQO).

## IMPACTS OF THE PROPOSED ACTION

The visual resources of the areas identified in table 4-1 would undergo significant adverse impacts as a result of the proposed action. The placement of the pipeline in these areas would exceed the allowable levels of contrast for each VRM Class or VQO established for the particular segment of the pipeline corridor. Areas where impacts would exceed the acceptable levels of contrast for a specified VRM Class are placed in VRM Class 5, (indicating rehabilitation would be necessary) Areas where impact would exceed levels of contrast for a specified VQO are labeled as Unacceptable Modification (also indicating rehabilitation would be necessary).

The total number of miles and acres of significant adverse visual resource impacts from the proposed action, alternatives, and variations are summarized by VRM Class and VQO in table 4-2.

TABLE 4-1.

SIGNIFICANT ADVERSE VISUAL RESOURCE IMPACTS OF THE PROPOSED ACTION

| MP | Affected Landscape Feature[1] | Critical Viewpoint[2] | Duration of Impact[3] | Contrast Rating Feature Score[4] | VRM Class and/or VQO[5] |
|---|---|---|---|---|---|
| **PIPELINE** | | | | | |
| MP 85-MP 110 | Vegetation | Interstate 80 | Long Term | -/22/- | 2 |
| MP 118-MP 123 | Vegetation | Access to proposed Currant Creek Recreation Area. | Long Term | -/27/- | R,PR |
| MP 130-MP 133 | Vegetation | U.S. Highway 40 | Long Term | -/22/- | R |
| MP 133-MP 137 | Vegetation | Recreation Areas | Long Term | -/18/- | PR |
| MP 137-MP 144 | Vegetation | Recreation Areas | Long Term | -/15/- | R |
| MP 153-MP 158 | Landform, vegetation. | U.S. Highway 6 | Long Term | 15/19/- | 2,R,PR |
| MP 183-MP 190 | Vegetation | Highway 132 | Long Term | -/23/- | 3 |
| MP 190-MP 195 | Landform, vegetation. | Nephi, Highway 132 | Long Term | 22/19/- | 3 |
| MP 232-MP 235 | Landform, vegetation. | Interstate 15 | Long Term | 26/22/- | 2 |
| MP 370-MP 395 | Landform, vegetation. | Highway 18 | Long Term | 17/17/- | 3,R,PR |
| MP 495-MP 505 | Landform, vegetation. | Frenchman Mountain-Rainbow Gardens. | Long Term | 17/18/- | 3 |
| **ANCILLARY FACILITIES** | | | | | |
| Sage Compressor Station and maintenance base: | | | | | |
| MP 0 | Vegetation, structure | Highway 51/89 and Highway 89/30N. | Long Term | -/21/29 | 4 |
| Cedar City maintenance base: | | | | | |
| Cedar City, Utah Vicinity | Vegetation, structure | Cedar City, Interstate 15. | Long Term | -/22/26 | 3 |

[1]The composition of the characteristic landscape would be modified by changing the landform, water form, or vegetation or by adding a structure to the landscape.

[2]A critical viewpoint is the point where the proposed change would be most apparent.

[3]Duration of impact can be described as:
Temporary--During construction through first or second growing season.
Short term--For 2 to 5 years following construction.
Long term--5 years to project life to (20 years) or longer.

[4]Contrast Rating Feature Score is a value which the contrast of a specific area could not exceed without creating a significant adverse visual impact.

VRM Class 2 and VQO R both have a Feature Score of 12.
VRM Class 3 and VQO PR both have a Feature Score of 16.
VRM Class 4 and VQO M,MM both have a Feature Score of 20.
See appendix I for further explanation.

[1]See table 3-10 for definitions of terms.

TABLE 4-2.

SUMMARY OF SIGNIFICANT ADVERSE VISUAL RESOURCE IMPACTS FROM THE PROPOSED ACTION, ALTERNATIVES, AND VARIATIONS

| Route | Number of Miles and Acres in Each VRM Class/VQO[1] | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Class 1 | | Class 2 | | Class 3 | | Class 4 | | P | | R | | PR | | M | | MM | | Totals | |
| | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres | Miles | Acres |
| **PIPELINE** | | | | | | | | | | | | | | | | | | | | |
| Proposed Action | - | - | 30 | 364 | 29 | 352 | - | - | - | - | 20 | 242 | 18 | 216 | - | - | - | - | 97 | 1,176 |
| Alternative A, Northern Systems | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| Alternative B, Sanpete Valley | - | - | 37 | 449 | 19 | 230 | 3 | 36 | - | - | 20 | 243 | 18 | 218 | - | - | - | - | 97 | 1,176 |
| Alternative C, Central Nevada | - | - | 64 | 775 | 22 | 267 | - | - | - | - | 21 | 255 | 16 | 194 | - | - | 1 | 12 | 124 | 1,503 |
| Alternative D, Sevier-Escalante Desert | - | - | 27 | 327 | 29 | 352 | - | - | - | - | 20 | 242 | 18 | 218 | - | - | - | - | 94 | 1,139 |
| Alternative E, West Salt Lake | - | - | - | - | 17 | 206 | - | - | - | - | 17 | 206 | 11 | 133 | - | - | - | - | 45 | 545 |
| Alternative F, Provo Canyon | - | - | 67 | 812 | 17 | 206 | - | - | - | - | 7 | 85 | 14 | 170 | - | - | - | - | 105 | 1,273 |
| Variation 2, Thistle Creek | - | - | 10 | 121 | 13 | 158 | - | - | - | - | - | - | - | - | - | - | - | - | 23 | 279 |
| Variation 3, East Las Vegas | - | - | 15 | 182 | 5 | 60 | - | - | - | - | - | - | - | - | - | - | - | - | 20 | 242 |
| Variation 4, Fort Mojave | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| Variation 5, Mill Creek | - | - | 6 | 73 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 6 | 73 |
| Variation 6, Daniels Canyon | - | - | 4 | 49 | - | - | - | - | - | - | 26 | 315 | - | - | - | - | - | - | 30 | 364 |
| **ANCILLARY FACILITIES** Route Name, Facility Location | | | | | | | | | | | | | | | | | | | | |
| Proposed Action | | | | | | | | | | | | | | | | | | | | 20 |
| Compressor Station (1) | - | - | - | - | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - |
| Maintenance Bases (4) | - | - | - | - | - | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Alternative A, Northern Systems | | | | | | | | | | | | | | | | | | | | 15 |
| Compressor Station (1) | - | - | - | - | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - |
| Alternative B, Sanpete Valley | | | | | | | | | | | | | | | | | | | | 20 |
| Compressor Station (1) | - | - | - | - | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - |
| Maintenance Bases (4) | - | - | - | - | - | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Alternative C, Central Nevada | | | | | | | | | | | | | | | | | | | | 30 |
| Compressor Station (1) | - | - | - | - | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - |
| Maintenance Bases (6) | - | - | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Alternative D, Sevier-Escalante Desert | | | | | | | | | | | | | | | | | | | | 20 |
| Compressor Station (1) | - | - | - | - | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - |
| Maintenance Bases (4) | - | - | - | - | - | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Alternative E, West Salt Lake | | | | | | | | | | | | | | | | | | | | 20 |
| Compressor Station (1) | - | - | - | - | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - |
| Maintenance Bases (4) | - | - | - | - | - | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Alternative F, Provo Canyon | | | | | | | | | | | | | | | | | | | | 20 |
| Compressor Station (1) | - | - | - | - | - | - | - | 15 | - | - | - | - | - | - | - | - | - | - | - | - |
| Maintenance Bases (4) | - | - | - | - | - | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

[1]Refer to table 3-10 for definitions.

NOTES: Acreage figures are based upon a 100-foot wide construction right-of-way. Summaries for the alternatives include those portions of the proposed action which precede and follow the alternative, whereas summaries for the variations include only those portions which deviate from the proposed action.

*NO SIGNIFICANT ADVERSE VISUAL RESOURCE IMPACTS.

# Land Uses: Recreation Resources, Agriculture, and Conflicts with Land Use Plans, Controls, and Constraints

## RECREATION RESOURCES

### Criteria for Analysis

Impacts related to any components of the proposed action, alternatives, or variations are categorized as short term and long term. Short term impacts commence with the construction of the proposed pipeline, alternatives, or variations and associated facilities and continue up to one season beyond construction completion. Long term impacts would last from 1 year to the life of the proposed project (20 years).

The significance of the impact is determined by the length of impact (short term versus long term) in relation to the public's sensitivity and perception of the impact. For recreationists, this sensitivity and perception can be low, medium, or high, depending on their expectations. For example, a hiker expecting a pristine hiking experience could be highly offended when confronted with pipeline construction; this would produce a high sensitivity level. A hiker who expects to be periodically confronted with humanity's influences upon the environment (i.e., a view of a road, marina, or parking lot) and yet desires a seminatural experience would probably not be offended when confronted with pipeline construction. A hiker on a paved trail within a municipal park expecting an urban experience would also not be offended by pipeline construction. To analyze impacts, the following matrix was used:

| | | Length of Impact | |
|---|---|---|---|
| | | Short Term | Long Term |
| Public Sensitivity and Perception | Low | Not Significant | Not Significant |
| | Medium | Not Significant | Significant |
| | High | Significant | Very Significant |

### Impacts of the Proposed Action

Construction of the pipeline in the vicinity of the Strawberry Reservoir Recreation area would create noise, dust, visual impact, and possibly some traffic disruption along the west shore road. However, since the construction area would be 1 to 1.5 miles west of the major access road (See map 3-2, 'Recommended Plan (Strawberry Reservoir Enlargement - 1978)'), the majority of the users would not be affected. Because few people would be affected and the duration of impact would be short term (4 to 6 weeks), these impacts would be insignificant. Public sensitivity would probably be low to medium, since intrusions upon the recreational experience in the area (e.g., developed campgrounds, motorboats, Phillips Petroleum drill rig, automobile traffic on the west shore road, etc.) are common and expected.

Pipeline construction could affect the use of several summer homes or lodges in this area, authorized by the FS under special use permits. Noise, dust, and odor created by adjacent pipeline construction would create a high public concern. Normal access to the summer homes could also be temporarily modified, however, ingress and egress would be maintained.

Construction would significantly affect competitors and spectators at the annual Mint 400 ORV event in the Dry Lake Valley (Nevada) by creating a serious safety hazard. The Mint 400 schedule would conflict with the proposed pipeline construction schedule. This safety impact (conflict with numbers of people and vehicles) would last approximately 1 week during construction and would be perceived with high sensitivity by ORV competitors and spectators.

Similar impacts for ORV events and general free play ORV activity could probably occur in the Las Vegas Sand Dunes Recreation Area.

There would be short term (4 to 6 weeks) significant impacts from the proposed construction on the proposed Frenchman Mountain-Rainbow Gardens National Natural Landmark and proposed Clark County Wetlands Park. Public sensitivity to visual intrusions, noise disruptions, construction equipment odors, and generated dust would be high for

more pristine areas where passive recreational uses take place.

Additionally, there could be a long term reduction in scenic quality enjoyed by recreationists in the area. (See 'Visual Resources' for additional information.)

No recreational experiences would be affected by project ancillary facilities (e.g., Sage Compressor Station, maintenance bases, meter station, etc.), since none would be located near formally managed recreation areas.

## AGRICULTURE

### General Impacts

The main concerns related to construction, operation, and maintenance of the proposed action, alternatives, and variations on agricultural lands are: (1) loss of crop production during the construction year, (2) restoration of crop production, (3) reduction of grazing until areas are restored, (4) disturbance of topsoil and soil compaction, (5) disturbance to irrigation systems during irrigation season, (6) disturbance of subsurface drainage systems, and (7) long term land use changes at surface facility sites.

Most impacts to agricultural land would be insignificant and short term (1 or 2 years) because restoration should be successful. The Erosion Control, Revegetation, and Restoration Guidelines proposed by RMPC (appendix C), would assure successful restoration of all prime agricultural land, other cropland, and native rangeland. These guidelines are discussed in more detail in the *Soils and Agriculture Technical Report* (BLM, 1981c).

Irrigation water delivery systems and subsurface drainage systems could be disrupted by pipeline construction. With the appropriate timing of construction to avoid crucial irrigation periods and the implementation of restoration measures (proposed by the applicant and presented in appendix C), this impact would be minimized.

Impacts to fruit orchards 20 acres and larger would be significant due to the length of time required to restore production to preconstruction conditions and the requirement that trees would not be allowed to grow over a 25-foot wide section of the pipeline right-of-way. However, the limited number of orchards and onsite realignment of the pipeline would minimize this impact.

A significant agricultural concern is land use change which would occur where permanent surface facilities changed agricultural land to industrial use for the life of the project. The result would be a loss of crop production for the life of the project (20 years). This potential loss would be significant where cropland areas 5 acres or larger would be required for surface facility sites. Where surface facility sites were located on native range areas used for grazing, impacts would be insignificant.

### Impacts of the Proposed Action

Construction of the proposed action would disturb 1,065 acres of cropland for one growing season. Of the surface facilities, the Sage Compressor Station would be located on native grazing land, and one maintenance base could be built on 5 acres of agricultural land somewhere along the proposed route. Table 3-12, shows the acres of agricultural land which would be disturbed by the proposed action, alternatives, and variations.

Agriculture experiment station officials have indicated that right-of-way alignment would minimize the impacts to the station near Nephi, Utah (Van Eppes 1981).

## CONFLICTS WITH LAND USE PLANS, POLICIES, AND CONTROLS

The proposed action would conflict with the Utility Rule of the proposed Forest Land Management Plan for the Uinta National Forest. This would violate the intent of the plan in designating lands suitable for utility corridors and open up a new *de facto* corridor susceptible to use by other utilities.

The proposed action would not follow the over 3,000-foot wide corridor administered by BLM through the 70,000 acres transferred from BLM administration to the Moapa Indian Reservation. The BLM policy is to follow this corridor wherever possible. If the proposed route is authorized, the RMPC would have to negotiate a right-of-way with the tribal council for passage through the new reservation lands. If a new *de facto* corridor is created, there would be two corridors across the reservation which could be considered by sponsors of future utility projects: one on public lands, for which BLM would grant rights-of-way and one on reservation lands, which would require right-of-way negotiation.

At this time, it is unknown whether or how the proposed action would conflict with the forthcoming (June 1981) Draft Management Master Plan for the proposed Clark County Wetlands park in southern Nevada.

# Socioeconomics

## CONSTRUCTION SCHEDULE

Employment for RMPP construction would occur from mid-April through October 1982, with peak employment commencing in mid-June and ending in early September. Figures 4-1 and 4-2 show the labor requirements for each type of pipeline construction spread. Seven spreads would work simultaneously to complete the project. (Table 2-3 lists the number of employees for this proposal.) Each pipeline spread would have at least one double-jointing yard where pipeline segments delivered by railroad would be coated and welded in two- or three-piece lengths. RMPC estimates that 21 percent of each spread's peak work force would be located at these yards. The crews performing these functions, unlike their associates on the right-of-way, would be living in one location for up to 5 months. Since these workers are part of each pipeline spread, their impact is included in the following regional analysis. However, because they would be largely in one location for a protracted period, their impact would be focused on specific towns.

Separate construction work forces would be used for the Sage Compressor Station and maintenance base, the four other maintenance bases, and the communication network. The compressor station and maintenance base at Sage, Wyoming, would be built in 6 months; the initial crew of 60 workers would peak in the third month at about 100 workers. Peak construction would last only 1 month. Local contractors would construct the four maintenance bases (Heber City, Nephi, Cedar City, and Las Vegas), employing an average of 12 workers each during construction. A peak force of 20 workers would be used for 2.5 months. Erection of the communication system would employ two 6- person crews for 4 months and two 3-person crews for 2 months thereafter.

## PIPELINE WORK FORCE

At its peak, the project would employ 2,402 workers. This peak would last from 2.5 to 3 months. Local resources would provide 20 percent of the construction force; the remaining 80 percent would come from nonlocal labor pools. The average wage would be $119 per worker per day.

Previous studies examining the impact of pipelines and similar construction projects on economic and social conditions conclude that little or no significant adverse impact results from such construction (BLM 1979, 1980a, 1980e). Given the quick pace, short duration, and linear spacing of pipeline construction, the level of socioeconomic impact is low. This differs from the impact normally encountered with large fixed-site construction projects, where large numbers of workers remain in one location for long periods of time. Because of this difference, the following discussion examines the impact of transitory pipeline workers and the impact of workers at the compressor station and double-jointing yards separately.

On the right-of-way, there would be a peak work force of between 230 and 277 workers per spread, depending on whether the terrain was smooth or mountainous. Each of the seven construction spreads would move 1/3 to 1 mile per day, depending on terrain. Each crew would build approximately 100 miles of pipeline, except for spread 7, which would build 27 miles of pipeline. Because each spread would be moving at this rapid pace, the related socioeconomic impact in any one area would be transitory.

Also, the number of construction workers is very small relative to the population of the regions that would be affected. For example, the largest population increase that would occur in any region would be from spread 2 of the Sevier-Escalante Desert Alternative (Beaver, Iron, and Washington Counties, Utah), which would increase local population by only 0.75 percent. This spread would also create the largest increase in total employment, 1.48 percent. Local retail sales during construction would increase as workers spent their earnings, but this increase would also be small, the largest being 4.85 percent in the Needles, California area. None of the spreads would be large enough to place any significant demand on local medical facilities, education, police, fire, or other public services.

The only worker-related impact of consequence would be the demand on housing. Because pipeline workers move fairly frequently, most would seek temporary accommodations in hotels or motels, and some workers would bring camper vehicles and stay in campgrounds. Pipeline workers would compete with travelers and recreationists for these accommodations.

The personal preferences of pipeline workers complicate the housing impact analysis and handicap the identification of the communities that would be most affected. For example, if pipeline workers had a choice between living in a small town 10 miles from the route or a large town 20 miles from the route, they might choose to live in the large town if the entertainment or the quality of accommodations were better. However, in general, the demand for housing should have a cascade-like effect on towns near the pipeline route: the accommodations nearest the pipeline would fill up first; the overflow

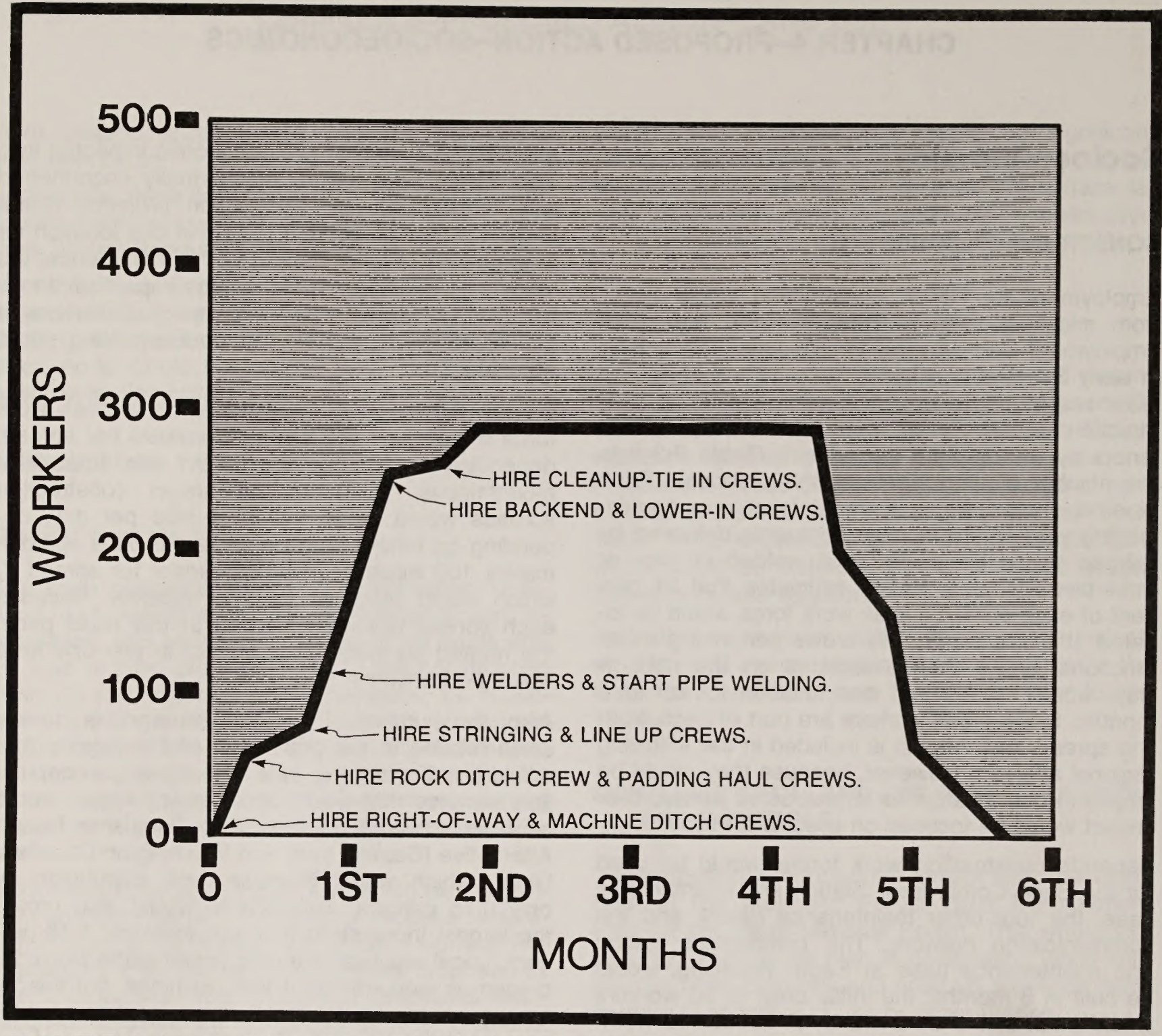



**FIGURE 4-1. EMPLOYMENT SCHEDULE: ROLLING COUNTRY**

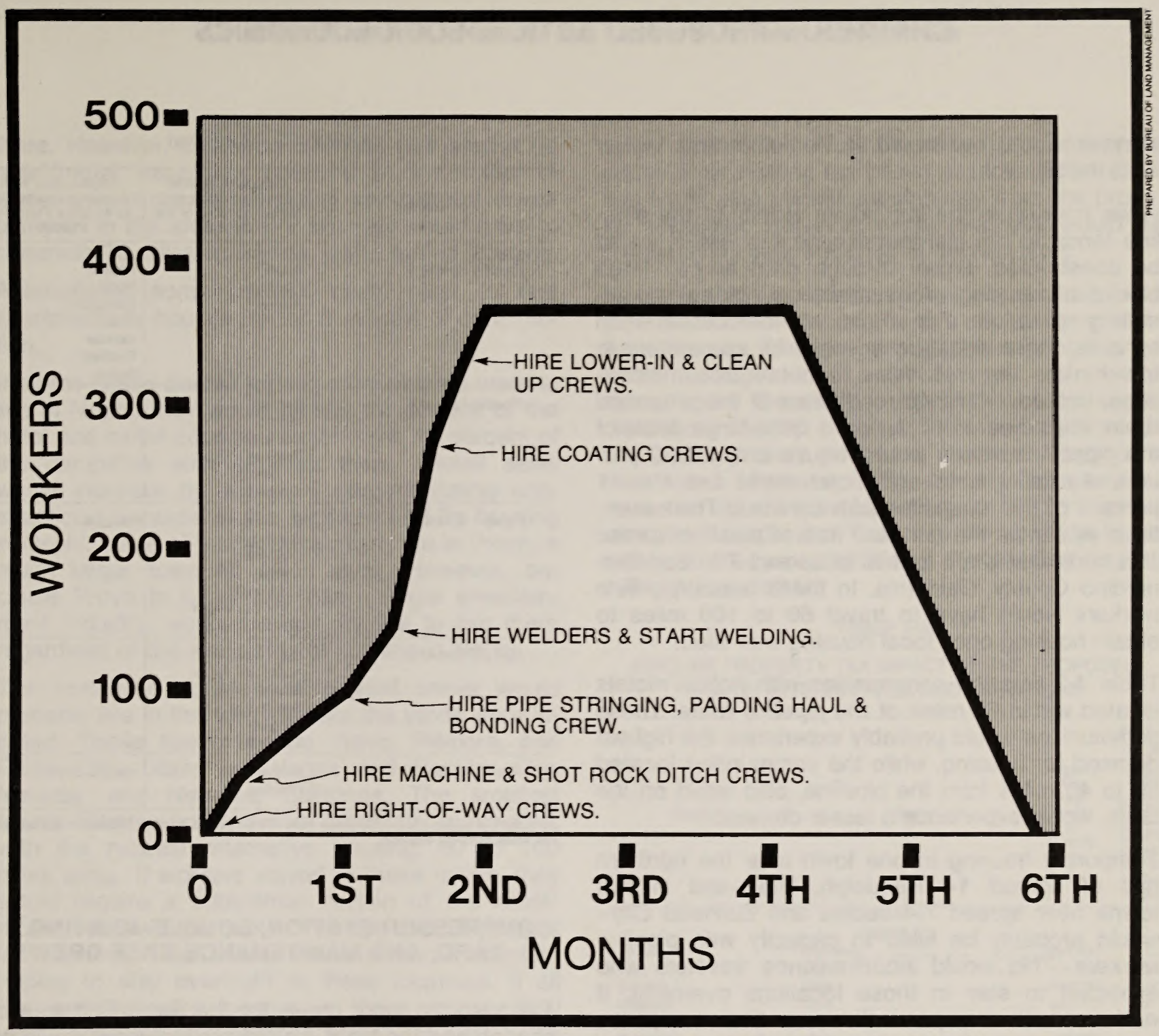



**FIGURE 4-2. EMPLOYMENT SCHEDULE: ROUGH MOUNTAINOUS TERRAIN**

workers would be forced to seek housing farther from the pipeline.

While housing in the immediate vicinity of the pipeline tends to be scarce--because the RMPP would be constructed largely through rural areas-- large blocks of housing are available within easy commuting distance. For most of the construction spreads, there would be no need for commuters to travel more than 40 miles to obtain accommodations. Indeed, within 40 road miles of the proposed route, the amount of housing is quite large. Most of the pipeline spreads would require only 2 to 9 percent of existing hotel and motel rooms and 4 to 11 percent of the campsites with services. The exceptions would be the northern half of pipeline spread 1 in northeast Utah, and all of spread 7 in San Bernardino County, California. In these areas, pipeline workers would have to travel 60 to 100 miles to obtain housing once local housing was filled.

Table 4-3 lists the communities with hotels/motels located within 20 miles of the pipeline route. These communities would probably experience the highest demand for housing, while the communities located 20 to 40 miles from the pipeline, also listed on the table, would experience a lesser demand.

Temporary housing in one town near the northern half of spread 1-- Randolph, Utah--and in two towns near spread 7--Needles and Bullhead City--would probably be filled to capacity with pipeline workers. This would inconvenience travelers who expected to stay in those locations overnight. If workers with campers did not find campsites nearby, they might be inclined to park their vehicles in streets near or in town, as occurred in Evanston, Wyoming, during construction of the MAPCO pipeline (Farley 1981).

TABLE 4-3

TOWNS WITH HOUSING ALONG THE PROPOSED ACTION

| Construction | Communities With Accommodations Within 20 Miles of the Pipeline | Communities With Accommodations 21 to 40 Miles From the Pipeline |
|---|---|---|
| Sage Compressor Station | Evanston<br>Randolph | Kemmerer<br>Garden City<br>[a]Logan |
| Pipeline Spread 1 | Evanston<br>Randolph<br>Coalville<br>Park City | Kemmerer<br>Garden City<br>[a]Logan<br>Morgan<br>Ogden<br>Salt Lake City<br>South Salt Lake |
| Pipeline Spread 2 | Park City<br>Heber City<br>Nephi | Salt Lake City<br>South Salt Lake<br>Gunnison<br>Mt. Pleasant<br>Orem<br>Lindon<br>Pleasant Grove<br>Payson<br>Provo<br>Springville |

TABLE 4-3—Continued

| Construction | Communities With Accommodations Within 20 Miles of the Pipeline | Communities With Accommodations 21 to 40 Miles From the Pipeline |
|---|---|---|
| Pipeline Spread 3 | Nephi<br>Fillmore<br>Beaver<br>Milford | Payson<br>Provo<br>Springville<br>Delta<br>Monroe<br>Richfield<br>Salina |
| Pipeline Spread 4 | Beaver<br>Milford<br>Cedar City<br>Parowan<br>St. George<br>Washington | |
| Pipeline Spread 5 | St. George<br>Washington<br>Logandale<br>Moapa<br>Las Vegas<br>North Las Vegas<br>Boulder City | Mesquite |
| Pipeline Spread 6 | Las Vegas<br>North Las Vegas<br>Boulder City<br>Searchlight<br>Laughlin<br>Bullhead City | |
| Pipeline Spread 7 | Bullhead City<br>Needles | Havasu City |

[a]Logan is approximately 70 miles from the proposed Sage Compressor Station and 55 miles from the pipeline.

## COMPRESSOR STATION, DOUBLE-JOINTING YARD, AND MAINTENANCE BASE CREWS

Because the work crews for the Sage Compressor Station and the eight double-jointing yards would be stationary for 5 months, the socioeconomic effects they produced would tend to be concentrated in the nearest communities, although some workers might choose to live in more distant communities. Most of the workers constructing the Sage Compressor Station would probably commute 60 miles or more to Logan, Tremonton, or Brigham City, Utah, because the closer communities have little or no available housing. Since the populations of these more distant towns are relatively large, the workers would have little impact on population, employment, retail sales, or police and medical services. Nevertheless, up to 17 percent of the hotel and motel rooms and 12 percent of the campsites in the area (Lincoln County, Wyoming, and Rich and Cache Counties, Utah) would be necessary to house RMPP personnel during the peak month of construction.

Long commuting might also be required for workers at the Evanston and Nephi double-jointing yards. The town of Evanston, Wyoming, is 10 miles east of the Evanston yard site; the double-jointing yard workers would require 11 percent of the hotel/motel rooms and 21 percent of the campsites

there. However, Evanston currently has almost no hotel/motel vacancies because of the influx of workers from recent petroleum and mineral developments in the area. RMPP workers would have to commute 70 miles to Ogden, Utah, to find housing.

Alternatively, some workers might elect to rent apartments or houses for the 5 months of construction.

If all the Nephi double-jointing yard workers were to live in Nephi, they would require 22 percent of the hotel and motel accommodations and 10 percent of the campsites with services there. (Retail sales would increase by almost 6 percent during construction.) Because of this high demand for housing in Nephi, some of the workers might live in Provo, a much larger town 40 miles away. However, because Provo is larger and has a larger entertainment industry, workers might choose to live there regardless of the availability of housing in Nephi.

The remaining double-jointing yard crews would probably live in the towns where the yards were located. These towns include Provo, Fillmore, and Cedar City, Utah; Las Vegas and Boulder City, Nevada; and Needles, California. The smallest towns, Fillmore and Needles, are relatively isolated, with the nearest alternative housing, 60 to 100 miles away. If workers stayed in these towns, they would require a substantial portion of the hotel/motel rooms--28 percent in Fillmore and 12 percent in Needles. This would inconvenience travelers hoping to stay overnight at these locations. If all the workers were located in these towns, they would generate an 8-percent increase in retail sales in Fillmore and a 3-percent increase in Needles. The towns of Provo, Cedar City, and Las Vegas, which are larger, would not be significantly affected.

None of the double-jointing yard work forces would place a significant demand on hospital or police services. Because the work would be done by local contract construction firms, construction of the maintenance bases would not result in any deleterious socioeconomic impact.

## OPERATION AND MAINTENANCE

The proposed RMPC would permanently employ about 68 people to operate and maintain its system. Of these, 27 would be employed at the operating headquarters in Salt Lake City; the remaining 41 employees would be spread among the five maintenance bases. This small work force would not create significant socioeconomic ramifications.

The anticipated project property taxes for the first year of operation are compared with existing county property tax revenues in table 4-4. The project could dramatically increase the property tax revenues in Rich and Piute Counties, Utah, mainly because their existing tax bases are low. Other counties could also benefit substantially from the project tax revenues. However, these revenues would decrease every year because of depreciation.

In Utah, the amount a pipeline depreciates each year depends on various factors such as productivity of the gas field, gas throughput, relationship between salvage value and earnings, and maintenance costs. Generally, a pipeline does not depreciate more than 80 percent by the end of its useful life (approximately 20 years) if the throughput is maintained. However, if the volume decreases, so does the value of the pipe (Sugino 1981). Depreciation in Nevada and California is currently based solely on the expected life of the pipeline (DuPaul 1981, Wilcox 1981).

TABLE 4-4.

PIPELINE PROPERTY TAX IMPACT OF THE PROPOSED ROUTE, ALTERNATIVES, AND VARIATIONS

| County | State | Property Tax Payments to County ($) | Property Tax Payments as Percent of County Property Tax Receipts |
|---|---|---|---|
| | **RMPP** | | |
| Lincoln | Wyoming | 301,000 | 3.5 |
| Rich | Utah | 414,000 | 52.1 |
| Summit | Utah | 402,000 | 6.2 |
| Wasatch | Utah | 409,000 | 27.8 |
| Utah | Utah | 175,000 | 0.5 |
| Sanpete | Utah | 77,000 | 4.5 |
| Juab | Utah | 306,000 | 23.0 |
| Millard | Utah | 502,000 | 22.0 |
| Beaver | Utah | 291,000 | 30.2 |
| Iron | Utah | 355,000 | 8.1 |
| Washington | Utah | 395,000 | 9.2 |
| Lincoln | Nevada | 145,000 | 18.6 |
| Clark | Nevada | 980,000 | 1.1 |
| San Bernardino | California | 208,000 | 0.1 |
| | **Sanpete Valley Alternative** | | |
| Sanpete | Utah | 170,000 | 10.0 |
| Sevier | Utah | 516,000 | 24.3 |
| Piute | Utah | 205,000 | 71.7 |
| Garfield | Utah | 102,000 | 12.4 |
| Iron | Utah | 544,000 | 12.5 |
| | **Sevier-Escalante Desert Alternative** | | |
| Juab | Utah | 256,000 | 19.3 |
| Millard | Utah | 672,000 | 29.5 |
| Beaver | Utah | 291,000 | 30.2 |
| Iron | Utah | 331,000 | 7.6 |
| | **West Salt Lake Alternative** | | |
| Bear Lake | Idaho | 20,000 | 1.1 |
| Franklin | Idaho | 51,000 | 2.8 |
| Cache | Utah | 24,000 | 0.3 |
| Box Elder | Utah | 247,248 | 3.8 |
| Tooele | Utah | 191,000 | 4.3 |
| Juab | Utah | 265,000 | 20.0 |
| Millard | Utah | 595,000 | 26.1 |
| | **Provo Canyon Alternative** | | |
| Wasatch | Utah | 251,000 | 17.1 |
| Utah | Utah | 577,000 | 17.1 |
| Juab | Utah | 337,000 | 25.4 |
| | **Thistle Creek Variation** | | |
| Utah | Utah | 239,000 | 0.7 |
| Sanpete | Utah | 73,000 | 4.3 |
| | **East Las Vegas Variation** | | |
| Clark | Nevada | 1,001,300 | 1.1 |
| | **Fort Mojave Variation** | | |
| San Bernardino | California | a | a |

TABLE 4-4.—Continued

| County | State | Property Tax Payments to County ($) | Property Tax Payments as Percent of County Property Tax Receipts |
|---|---|---|---|
| | **Mill Creek Variation** | | |
| Utah | Utah | 241,000 | 0.7 |
| | **Daniels Canyon Variation** | | |
| Wasatch | Utah | 462,000 | 31.4 |
| Utah | Utah | 50,000 | 0.1 |

[a]This variation is the same length as the portion of the proposed route it would supercede; therefore, there would be no difference in county tax receipts.
Sources: RMPP 1980. Estimates for San Bernardino County and all alternatives and variations based on estimated value of facilities and county tax rate.

## Native American Issues

Pipeline construction spread 7 would cross 4.5 miles of the Fort Mojave Indian Reservation. The 27-mile long spread would have a peak work force of 290 and an average work force of 150. According to the applicant, 20 percent of the work force would be local hires; this could have a short erm, positive impact on the 64 unemployed Fort Mojave Tribal members.

The income from leasing the 4.5 miles of pipeline right-of-way would provide long term beneficial income to the Fort Mojave Tribe but there is no way to quantify the total income, since the amount would be negotiated between the tribal council and PG&E and PLS.

The Moapa Indian Reservation would now be crossed by the proposed action since the legislation (P.L. 96-491) which expands the reservation by approximately 70,000 acres has recently passed. Information of effects to the residents from the proposed pipeline will be added to the final EIS.

The proposed pipeline route, alternatives, and variations have the potential for both beneficial and adverse impacts to cultural resources. The following discussion of impacts applies to the proposed action and all alternatives and variations. The various occurrences of cultural resources are described in chapter 3.

After a final route has been selected, additional inventories which may cause an indirect beneficial impact would be made. Such studies should provide data on previously unrecorded sites, many of which are currently being affected by ORV's, vandals, and artifact collectors. Another indirect beneficial impact on cultural resources that may occur would be the recovery of information from significant sites found during the cultural resource inventory or during construction monitoring.

Adverse impacts to cultural resources would occur during ground disturbing activities associated with construction of the pipeline. Construction could alter, damage, or destroy cultural resources which could result in the loss of: specific scientific and cultural information, physical representation of the resource, a portion of the resource base for future research, and artifact materials.

## Cultural Resources

A Memorandum of Agreement (MOA) will be developed with the Advisory Council of Historic Preservation, the State Historic Preservation Offices (SHPO's) of the states involved with the project, and the Federal agencies with compliance responsibility for this project, in accordance with the procedures outlined in 36 CFR, Part 800, 'Protection of Historic and Cultural Properties.' The MOA will outline responsibilities for full and complete inventory, evaluation, and mitigation of cultural resources.

The MOA will recommend that the project be designed to avoid cultural resources that appear to meet the criteria for inclusion on the National Register of Historic Places. If this avoidance procedure is neither prudent nor feasible, plans for mitigation would be developed according to the procedures outlined in the MOA. Avoidance would specifically be recommended for the significant cultural resources identified in appendix L. Additional cultural resources requiring compliance procedures could also be identified by the field inventory.

Indirect adverse impacts could occur from construction workers (or others) participating in unauthorized artifact collecting. Alteration, damage, or destruction of cultural resources could occur if more people entered the area because of easier access. However, few new roads are anticipated for this project; therefore, this would not be a significant adverse impact.

The magnitude of impact on cultural resources cannot be absolutely determined until an alignment is chosen and a centerline is staked and examined for cultural resources. However, estimates can be made on the expected density and significance of cultural resources from existing data. Table 2-11 summarizes the estimated density and significance for prehistoric sites along the proposed route, alternatives, and variations. The assumptions and methods employed to make these estimates are detailed in the *Cultural Resources Technical Report (Museum of Northern Arizona 1981).*

# Geology and Topography

## GEOLOGY

No geological impact would result from this project. (Geologic hazards to the project are discussed in chapter 3.) Nevertheless, significant hazards to the project exist because of faults, ground liquefaction, and landslides. Because the pipeline would cross the Wasatch fault near populated areas, the FERC staff recommends in chapter 5 that the project incorporate certain design measures.

The applicant would avoid areas of high liquefaction potential and landslides to the maximum extent feasible. Mitigation measures other than avoiding these hazards are not likely to be effective or economically feasible. For this reason and because the areas of potential liquefaction do not coincide with populated areas, the FERC staff recommends no special design measures for these problems.

Volcanic and subsidence hazards would be insignificant for all routes analyzed.

## TOPOGRAPHY

The primary topographic impact from a pipeline project results from construction; there is no topographic impact related to operation, although minor secondary impact resulting from project-initiated erosion could occur. This type of erosion impact is discussed in 'Soils' and 'Vegetation.'

Long term impact would be limited to areas where excavation or fill would be required--most frequently at compressor stations, maintenance bases, or material stockpiling sites. Where a right-of-way must be placed perpendicular to a slope--sidehill construction--or where cliffs or ravines must be crossed, excavation is generally required to create a level working surface. Depending on the severity of the terrain, a permanent scar may result-- especially if the right-of-way is underlain by bedrock.

In general, however, after a pipeline trench has been backfilled, the only topographic evidence of the pipeline is the berm--about 12 inches high, tapering to grade at the edges of the filled trench. This berm should disappear within a few years. Unless specified otherwise in right-of-way agreements, bedrock removed from the trench during RMPP construction would be left along the edge of the right-of-way, creating an unnatural but generally inconsequential row of rocks.

Where the bottom of a trench is in bedrock, it is generally necessary to protect the pipe coating by providing a pad of select backfill under the pipeline. If trench spoil could not be used, the excavation of such padding would also create topographic impact. For instance, the applicant has estimated that 534,000 cubic yards of clean dirt or sand would be required as padding. The applicant states that this material should be available from commercial sources. However, if it were not available and the total amount had to be taken from new pits, approximately 60 acres would be excavated to a depth of about 6 feet. (These numbers are illustrative only.)

The maintenance bases and compressor stations would be located on fairly level ground, minimizing the need for substantial modification to the topography. This would also be true for double-jointing yards located at railroad sidings. Double-jointing yards located along the right-of-way itself might not be on level ground, but since each yard would encompass only about 20 acres, very little grading should be required.

The topographic impact from construction along the pipeline, as well as from double-jointing yards and the maintenance bases, would generally be minimal, particularly if double-jointing yard and maintenance base sites were chosen to avoid difficult terrain. Therefore, only those portions of the proposed route and its alternatives where excavation is likely to create an irreparable scar are discussed. This would be the case whenever sidehill construction took place on side slopes greater than approximately 30 percent (3 vertical to 10 horizontal), or where a near-vertical surface (slope greater than 100 percent) had to be crossed at right angles. All sidehill construction over 1 mile long has been considered. For a 30-percent slope, the right-of-way excavation would involve a total of at least 20 feet of cut face--assuming the hill could support a vertical face. The vertical height of the excavation would be 23 feet if the hill could support only a 1-to-1 slope. These figures assume a two tiered working surface 36 feet wide uphill from the pipe for tractors and 19 feet wide for strung pipe and trench. If vertical cuts were involved, the total disturbed area, including the temporary spoil pile, would be 100 feet wide.

The RMPP would require about 22 miles of sidehill construction on slopes of about 30 percent. There are at least three areas where slopes of greater than 100 percent would be crossed at right angles: the Mineral Mountains (MP 292), Beaver Dam Wash (MP 415), and Toquop Wash (MP 432). The sidehill areas are:

| MP | Area |
|---|---|
| 54-55 | South of Wasatch |
| 68-69, 71-73, 75, 80-81 | Chalk Creek Canyon |
| 52, 54, 159 | North of Spanish Fork, Dairy Fork |
| 163-165 | Vicinity of Smith Reservoir |
| 167 | Near Brown's Peak |
| 184-185 | Water Hollow |
| 190-196 | Salt Creek Canyon |
| 373-375 | Holt Canyon |
| 387, 393 | Near Veyo |

## Water Resources

### GENERAL IMPACTS

The flow characteristics and the bed composition of the streams which would be crossed by the alternatives and variations are similar to those of the proposed action; therefore, the impacts from construction of crossings would be the same. The only difference would be how many streams were crossed. For the numbers and types of streams crossed, refer to chapter 3. For listings of streams, refer to the *Water Resources Technical Report*.

### IMPACTS OF THE PROPOSED ACTION

The proposed action would cross many intermittent and perennial streams. Construction would disturb both the banks and the beds, thus raising the amount of suspended sediments to unquantifiable levels higher than normal. This construction-induced load would be transported downstream and affect aquatic life to an insignificant degree. The calculated distances which the various percentages of construction-induced sediment would be transported are shown in the following list. The list is based upon two types of typical streams: those with a cobbly or gravelly bottom and those with a sandy type bottom.

Streams which have a cobbly or gravelly bottom would deposit their sediments in the following pattern:

| Sediment | Percent of Load Lost | Distance (Feet) |
|---|---|---|
| Sand and Gravel | 50 | 5 |
| Silt | 90 | 2000 |
| Clay | 100 | 200,000 |

Streams which do not have a cobbly or sandy type bottom would deposit their sediments in the following pattern:

| Sediment | Percent of Load Lost | Distance (Feet) |
|---|---|---|
| Sand and Gravel | 50 | 25 |
| Silt | 80 | 2000 |
| Clay | 100 | 200,000 |

The majority of the construction-induced sediment would be transported such a short distance that the effects would be insignificant.

## Noise Quality

The Noise Control Act of 1972 assigns the primary responsibility for noise control to state and local governments, with assistance and guidance from the Federal Government. In response to this act, EPA published guidelines in March 1974, 'Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety,' which evaluate the effect of various levels of environmental noise. EPA emphasizes that the identified levels discussed in the document should not be interpreted as a Federal ambient noise standard, since they consider neither

cost nor technical feasibility. Rather, the guidelines provide information for state and local governments to use in developing their own ambient noise standards. These levels are summarized in table 4-5. There are no state regulations governing noise emissions during construction or operation of the proposed project. (See figure 3-1 to determine discussion of noise quality by alternative.)

Pipeline construction would cause a temporary impact on noise quality. The specific noise levels would depend on the equipment involved; the impact would depend on the location of the potential receptors. Noise levels from construction machinery would be typical of those associated with shallow digging and earthmoving operations. Typical noise levels for the various kinds of construction equipment to be used are presented in table 4-6. Typical noise levels attributable to a construction spread are about 70 dB(A) at 250 feet from the pipeline and 60 dB(A) at 2,500 feet. Any receptor adjacent to the right-of-way would be affected only while a spread was working in the area.

TABLE 4-5.

SAFE NOISE LEVELS RECOMMENDED BY EPA

| Effect | 24-Hour Average Noise Level |
|---|---|
| Hearing Loss | 70 dB(A) |
| Outdoor Activity Interference and Annoyance | 55dB(A) |
| Indoor Activity Interference and Annoyance | 45 dB(A) |

TABLE 4-6.

TYPICAL PIPELINE CONSTRUCTION EQUIPMENT NOISE LEVELS

| Equipment | dB(A) at 50 Feet |
|---|---|
| Side Boom | 78-92 |
| Backhoe | 80-92 |
| Bulldozer | 82-95 |
| Ditching Machine | 80-90 |
| Motor Crane | 78-87 |
| Dragline | 80-90 |
| Backfiller | 82-95 |
| Welding Rig | 72-82 |
| Air Compressor | 85-91 |
| Jack Hammer | 88-98 |
| Trucks (Heavy Duty) | 82-92 |
| Pickup Trucks | 70-85 |
| Automobile | 65-76 |
| Pile Driver | 95-105 |
| Scraper Grader | 80-94 |
| Generator | 71-82 |

At selected locations along the proposed right-of-way, controlled blasting would be required to fracture hard rock formations. This would elevate sound levels temporarily. Blasting would be conducted only during daylight hours to reduce possible disturbance.

Construction of the proposed Sage Compressor Station would take about 6 months. During this time, noise levels would vary with the type of activity and the actual equipment being used. The noise reaching nearby noise- sensitive receptors would be attenuated by distance, topography, air, and vegetation.

The 31,800 hp. of compression installed at the Sage Compressor Station would be the major source of noise emissions during the pipeline's operation. The applicant proposes to conduct a baseline noise monitoring survey at the Sage Compressor Station and booster station sites. The ambient noise data and distances to the nearest residences would be used in designing noise-suppression equipment for the compressor stations.

RMPC has provided sound spectrum data for gas turbine units similar to the proposed compressor units. If ambient noise levels at the Sage Compressor Station site are estimated as an $L_{eq}$ of 43 dB(A) and an $L_{dn}$ of 49.4 dB(A), operational noise levels within the proposed plant boundary would exceed 70 dB(A). However, because of air and distance attenuation, the nearest residence, 3,950 feet to the southeast, would experience an $L_{eq}$ of only 44.8 dB(A) and an $L_{dn}$ of only 51.2 dB(A). These values were obtained by A-weighting the applicant's sound spectrum data.

Since vegetative absorption and natural or artificial barriers were not included in these calculations, the values are conservative. The 1.8-dB(A) increase over the ambient background levels would not be noticeable at the nearest residence (Arthur D. Little, Inc. 1977).

The EPA has identified an $L_{dn}$ of less than or equal to 55 dB(A) as necessary to protect public health and welfare from all known adverse effects of noise and has established this level as its long term goal. Its short term goal is an $L_{dn}$ of 65 dB(A). These goals are not Federal regulations, merely desired objectives. Although the $L_{dn}$ at the nearest receptor during operation of the Sage Compressor Station might be only 51.2 dB(A), the RMPC has not specified the ty of natural gas compressors that it plans to use at the Sage Compressor Station. Therefore, it is not possible to determine if the equipment eventually installed would conform to the specifications submitted by the applicant for similar units.

## Air Quality

### CONSTRUCTION-RELATED IMPACT

Pollutant emissions during construction of the proposed pipeline, compressor stations, and ancillary facilities would depend upon the type and amount of equipment used and the extent of its use. Ground-level concentrations of pollutants would depend on the relative locations of the construction. Generally, the emissions resulting from pipeline construction include hydrocarbons (HC's), $NO_x$, CO, $SO_x$, TSP, and water vapor. Dispersion of these pollutants would depend upon local atmospheric stability and meterological conditions. (See figure 3-1 to determine discussion of air quality by alternative.)

Construction would cause temporary and minimal deterioration of the ambient air quality. It would also cause localized, short term dust conditions, since almost all surface construction produces varying amounts of dust, depending upon soil moisture conditions, wind velocity, and the activity taking place. There is currently no EPA-approved model for calculating dust dispersion from construction vehicles along a pipeline right- of-way. While the severity and duration of any potential impact is difficult to predict, fugitive dust should not be a significant problem for the RMPP.

However, if proper dust suppression techniques were not implemented, some minor violations of the NAAQS for TSP could occur. The most likely places for this problem would be Utah County, Utah; Clark County, Nevada; and San Bernardino County, California. Each of these counties is in non-attainment status for TSP. Public use of the access roads and right-of-way for off-road ORV's could aggravate the surface disturbance.

Open burning of vegetation along the proposed route might be necessary to dispose of some debris resulting from clearing operations. If this were done, the applicant would be required to obtain the appropriate state and Federal permits.

### OPERATIONAL IMPACT

The operational air impact of the proposed project would depend upon the gas volumes transported in the system. Initially, the applicant proposes to transport 413,000 Mcfd of natural gas. If new gas supplies develop, the RMPC might transport up to 800,000 Mcfd to markets in California and the Southwest.

Emissions from the Sage Compressor Station, the major source of air emissions relate directly to the operation of the proposed project, are listed in table 4-7. The compression facilities necessary to expand the system are also included in the table. All of the compressors would use natural gas as their fuel source.

Table 4-7 shows that $NO_x$ (primarily $NO_2$) would be the only potential pollutant emitted for the 31,800-hp. Sage Compressor Station in excess of 250 tons per year, the EPA criterion of a new major emitting source under prevention of significant deterioration (PSD) regulations. Therefore, it is the only pollutant analyzed for the proposed 413,000-Mcfd volume.

TABLE 4-7.

POTENTIAL ANNUAL AIR EMISSIONS FROM RMPP COMPRESSION FACILITIES

| Volume | Compressor Station | Number of Units | Installed Horsepower[a] | Emissions (Tons/Year)[b] | | | | Annual Operation (Days/Year) | Fuel Requirements (Million Cfd) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | $NO_x$ | CO | HC | $SO_2$ | | |
| 413,000Mcfd | [c]Sage | 3 | 31,800 | 404 | 153 | 28 | 0.55 | 365 | 2.91 |
| 800,000 Mcfd | [c]Sage | 5 | 53,000 | 678 | 258 | 47 | 0.93 | 365 | 7.10 |
| | Booster Station 1 | 1 | 10,600 | 135 | 51 | 9 | 0.17 | 365 | 1.49 |
| | Booster Station 2 | 1 | 10,600 | 135 | 51 | 9 | 0.17 | 365 | 1.50 |
| | Booster Station 3 | 1 | 10,600 | 135 | 51 | 9 | 0.17 | 365 | 1.47 |

[a]Gas turbine units, installed horsepower.

[b]Emissions calculated by the potential to emit, according to EPA-AP-42, compilation of emission factors. Particulate matter emissions are negligible for natural gas fuel gas turbines.

[c]Total emissions do not include startup cycle for emergency gas generator.

As a new major emitting source, the Sage Compressor Station would require approval under EPA's PSD review program. This approval must be granted before construction and operation of the new source begins. RMPC claims that no PSD review would be necessary because only two of the three compressors would be operated simultaneously. However, according to EPA's AP-42 emission factors for heavy-duty natural gas compressors, the potential $NO_x$ emissions from two compressors, operating at maximum horsepower, would be 270 tons per year. At this emission rate, a PSD review would be necessary because the compressors would be a major source, emitting more than 250 tons per year.

If a PSD review were necessary for the proposed project, the Wyoming Department of Environmental Quality would perform it. PSD regulations require the application of the best available control technology (BACT) to reduce pollutants with the potential to exceed 250 tons per year. BACT is determined on a case-by-case basis by the appropriate reviewing authority. BACT for gas turbine compressors would require that a steam or water injection system be installed on each turbine.

The 800,000-Mcfd proposal would require two additional 10,600-hp. gas turbine compressors at the Sage Compressor Station and the simultaneous operation of all five compressor units. Total potential emissions would then increase to 678 tons per year of $NO_x$ and 258 tons per year of CO. A PSD review would be required at this time if it had not been conducted previously. However, if a PSD review had already been conducted, the initial and incremental emission increases of $NO_x$ and CO would have been examined in the initial review.

To transport the additional volumes of gas for the future, three additional compressor stations would have to be constructed in Summit, Millard, and Iron Counties, Utah. The applicant would install 10,600 hp. of compression at each station. The potential emissions from each booster station are shown in table 4-7. None of the three stations would be classified as a major source of air emissions; therefore, no PSD review would be required before their construction and operation. At this time, there are no definite plans to expand the Sage Compressor Station or to construct the booster stations.

All of the compressor stations would have to comply with the NAAQS for $NO_x$--an annual arithmetic mean of 100 ug per cubic meter. In addition, the new source performance standards which EPA has proposed for stationary natural gas-fired internal combustion engines would limit $NO_x$ emissions to 700 parts per million (ppm) at 15-percent oxygen on a dry basis. (These standards would apply to gas engines with more than 350 cubic inches of displacement per cylinder or those with eight or more cylinders with more than 240 cubic inches of displacement.) The proposed standards would apply to facilities whose construction begins after January 22, 1982. Since construction of the proposed project would begin after January 22, 1982, the proposed facilities would have to comply with this regulation.

Operation of the proposed Sage Compressor Station would increase the annual arithmetic mean $NO_x$ concentrations, predicted according to EPA's UNAMAP models, by a maximum of 3.27 ug per cubic meter about 456 meters from the source. If the additional 21,200 hp. of compression were installed, the total annual arithmetic mean $NO_x$ concentration would increase to 5.45 ug per cubic meter about 456 meters from the source. Assuming that the rural area surrounding the proposed compressor station has a background $NO_x$ level of 20 ug per cubic meter, as suggested by EPA's Ambient Monitoring Guidelines for Prevention of Significant Deterioration, the operation of the proposed facility would produce $NO_x$ concentrations of 23.27 ug and 25.45 ug per cubic meter, respectively. The ground-level concentration of $NO_x$ would not exceed the NAAQS. The expected ground-level concentration of CO for proposed operations would produce a 1-hour concentration of 24.6 ug per cubic meter and an 8-hour average of 17.2 ug per cubic meter.

The ground-level concentration of CO emissions from the 800,000-Mcfd operation of the Sage Compressor Station would produce a 1-hour ground-level concentration of 41 ug per cubic meter and an 8-hour average of 28 ug per cubic meter. Assuming a rural ambient background level of 1,156 ug per cubic meter, the potential 1-hour concentration would be 1,197 ug per cubic meter. Consequently, operation of the proposed Sage Compressor Station at 800,000 Mcfd would not exceed the required 1-hour average of 40 milligrams (mg) per cubic meter (40,000 ug) or the 8-hour average of 10 mg (10,000 ug) per cubic meter.

The major air emission from the booster stations would be $NO_x$; the primary pollutant would be $NO_2$. The maximum increase in the annual arithmetic mean for $NO_x$ would be less than 1 ug per cubic meter. Assuming a background level of 20 ug per cubic meter, the total potential impact of operating the booster stations would be 21 ug per cubic meter. No PSD review would be necessary for any of the booster stations because their total emissions would not exceed 250 tons per year for any criteria pollutant. The expected ground-level emissions of CO would produce a 1-hour concentration of 7.63 ug per cubic meter and an 8-hour concentration of 5.34 ug per cubic meter.

Table 4-8 compares the NAAQS with the potential ground-level concentrations produced by Sage Compressor Station and booster station operations.

The applicant has indicated that the only gas conditioning plants related to the RMPP would be those being constructed by Amoco Production Company and Chevron U.S.A., Inc., near Evanston, Wyoming. These facilities, the subject of previous BLM environmental review, have been authorized to begin construction (BLM 1980d). If any more processing plants are proposed to treat gas from the Rocky Mountain region, they would have to be authorized by the appropriate Federal, state, and local authorities before construction and operation.

No impact upon any Class I area is expected from construction and operation of the proposed project.

The operation of the Sage Compressor Station at the proposed level would produce an $NO_x$ ground-level concentration of 3.27 ug per cubic meter 456 meters from the source. The 800,000-Mcfd level would produce an $NO_x$ ground-level concentration of 5.45 ug per cubic meter about 456 meters from the source. Therefore, the nearest Class I area, 150 miles north of the Sage Compression Station, would not experience any ground-level impact. This result would also be expected for each of the booster stations because the potential ground-level impact from each station would be less than 1 ug per cubic meter at 456 meters from the source. The Class I area nearest any of the booster stations would be Zion National Park, 35 miles southeast of the booster station in Iron County, Utah.

TABLE 4-8.

COMPARISON OF AIR QUALITY STANDARDS AND EMISSIONS FROM COMPRESSOR STATIONS (ug per cubic meter)

| Volume | Significant Pollutant | Averaging Time | National Standard | | Wyoming Standard | Utah Standard | Ambient Background Assumed[a] | Increment Resulting From Sage | Increment Resulting From Booster Stations | New Ambient Level With Sage and Boosters |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Primary | Secondary | | | | | | |
| 413,000 Mcfd | $NO_x$ (Primarily $NO_2$). | Annual | 100 | 100 | 100 | 100 | 20 | 3.27 | --- | 23.27 |
| | CO | 8-hour | 10,000 | 10,000 | 10,000 | 10,000 | 1,156 | 8-hour 17.2 | --- | 1,173.2 |
| | | 1-hour | 40,000 | 40,000 | 40,000 | 40,000 | | 1-hour 24.6 | | 1,180.6 |
| 800,000 Mcfd | $NO_x$ | Annual | 100 | 100 | 100 | 100 | 20 | 5.45 | 1.0 | 25.45/ 21 |
| | CO | 8-hour | 10,000 | 10,000 | 10,000 | 10,000 | 1,156 | 8-hour 41 | 8-hour 5.34 | 1,197 1,161 |
| | | 1-hour | 40,000 | 40,000 | 40,000 | 40,000 | | 1-hour 28 | 1-hour 7.63 | 1,194 1,163 |

[a]Ambient background from EPA, 1978.

## Pipeline Safety

Transportation of natural gas by pipeline involves the risk of an accident and subsequent loss of product. For natural gas, the greatest hazard is an explosion or fire following the rupture of a pipeline.

Construction of the pipeline would conform to the safety requirements of DOT--including minimum burial depth (depending upon local jurisdiction) and block valve spacing. These requirements are intended to ensure adequate protection from catastrophic pipeline failures. DOT requirements also include minimum material design requirements for piping components, corrosion control, testing requirements, and provisions for operation and maintenance.

Classification (i.e., population density along 1-mile long sections of pipeline) determine additional safety measures--such as pipeline wall thickness, pipeline yield strength, and maximum design operating pressure-- which must be incorporated during design and construction of all natural gas pipelines. In addition, special boring procedures must be followed at railroad and highway crossings. There are four class locations for all onshore natural gas pipelines:

*Class1*--A location that has 10 or fewer buildings intended for human occupancy.

*Class 2*--A location that has more than 10 but less than 46 buildings intended for human occupancy.

*Class 3*--A location that has 46 or more buildings intended for human occupancy or an area where the pipeline lies within 100 yards of any building occupied by 20 or more persons.

*Class 4*--A location where buildings with four or more stories aboveground are prevalent.

Since February 9, 1970, all gas transmission companies have been required to notify the Office of Pipeline Safety Operations of any 'reportable' incident, defined by the CFR, Title 149, Part 191, and to submit a report (Form DOT F7100.2) within 20 days of the incident. Reportable incidents are defined by the Office of Pipeline Safety Operations as those which:

Resulted in a death or injury requiring hospitalization;

Required the removal from service of any segment of transmission pipeline;

Resulted in gas ignition;

Involved a leak requiring immediate repair;

Involved a test failure that occurred while testing with either gas or another test medium.

In the 9-year period from 1970 to 1978, there were 3,604 reportable incidents on natural gas transmission and gathering lines. The average number of incidents over the 9 years was 401 incidents per year; the maximum was 471, the minimum 255. In addition to the service failures, 1,797 test failures were reported. The test failures removed defects from the pipelines before service failures occurred; hence, these failures contributed to the safety of pipelines.

As figure 4-3 illustrates, the overall safety record of the natural gas transmission industry is excellent compared to the records of other transportation-related industries. The applicant expects to have 0.42 repair incidents per year. Independent calculations predict a mean accident rate of 1.4 incidents per 1,000 miles of pipe for the natural gas industry. Since the project would require 610 miles of 36-inch pipeline, 0.85 incidents per year could be expected. The number of incidents per year for each alternative is identified in table 2-11.

The number of service incidents (leaks and ruptures) and their percentage of distribution are given in table 4-9. The variations in numbers of incidents from year to year are illustrated in figure 4-4. The number of service incidents by pipeline diameter are given in table 4-10. Pipeline diameters equal to or greater than 34 inches incur a lower rate of service incidents than smaller diameter pipelines.

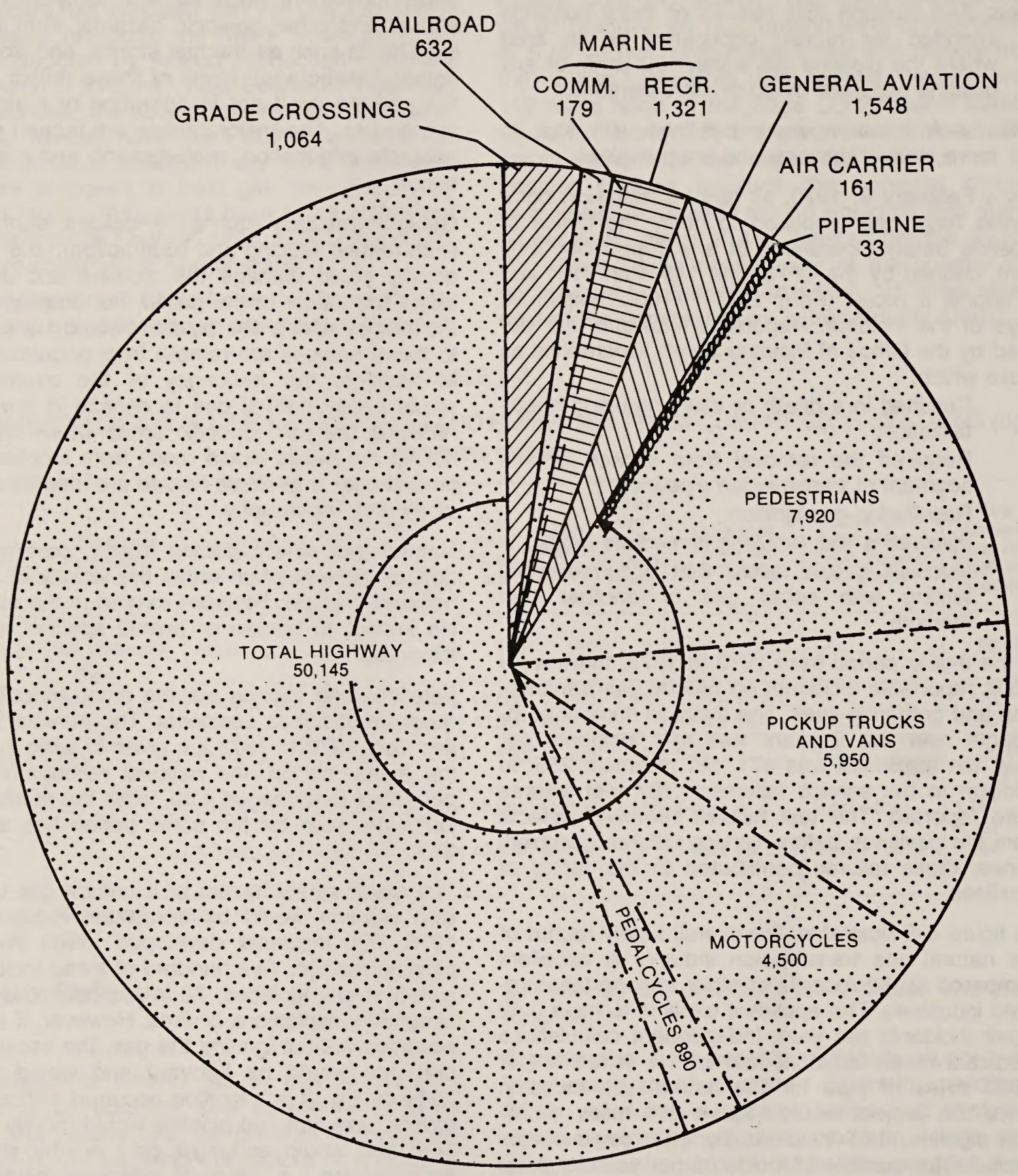
Outside force incidents, the leading type of incident, arise from the encroachment of mechanical equipment such as bulldozers and backhoes, from earth movement such as soil settlement or washouts and other geologic hazards, from weathering effects such as thermal strains, and from willful damage (sabotage). None of these reflect faults in the pipeline itself nor in operation or maintenance procedures. The major causes are human error, inaccurate information, misjudgment, and miscalculation.

Geologic hazards such as landslides, earthquakes, (with related faulting and liquefaction), and volcanic activity could damage the pipeline and adversely affect the safety of the public. Fortunately, most of the places where the pipeline would be subjected to these hazards are remote from populated areas. In addition, the frequency of the events which would cause natural gas to escape is low, further reducing the risk. Specific areas where significant risk to the public would result from location of the project near a geologic hazard are identified in 'Geology and Topography.'

Natural gas slowly leaking from a pipeline would destroy all vegetation within the vicinity of the leak because the gas displaces oxygen in the root zone. No impact to human or animal species would be expected.

Fatalities and injuries are the most serious consequences of failure accidents. The number of fatalities from 1970 to 1978 are given in table 4-11 Over the 9-year period, the national number of deaths per year has averaged 4.33, while the number of injuries per year for the same period has averaged 27.4.

The major safety hazard of a natural gas transmission pipeline would be a rupture. From 1970 to 1978, 335 incidents developed which involved a pipeline rupture. Two hundred of these incidents resulted in gas ignitions, 72 in explosions, and 63 in secondary explosions or fires. However, if a rupture occurred without igniting the gas, the escaping natural gas would be buoyant and would disperse quite rapidly. If gas ignition occurred without an explosion, the ruptured pipeline would merely act as a flare and would endanger only nearby structures. An explosion (i.e., physical explosion resulting from a pipeline rupture) would create the greatest hazard to the surrounding structures, equipment, and people within the immediate vicinity. The number of injuries and fatalities resulting from each incident would depend upon the location of the rupture and resulting explosion. Secondary explosions and fires could also result if natural gas infiltrated buildings and other structures; if a source of ignition were present, an explosion could occur.




SOURCE: AGA 1980.

FIGURE 4-3. COMPARISON OF 1978 TRANSPORTATION FATALITIES

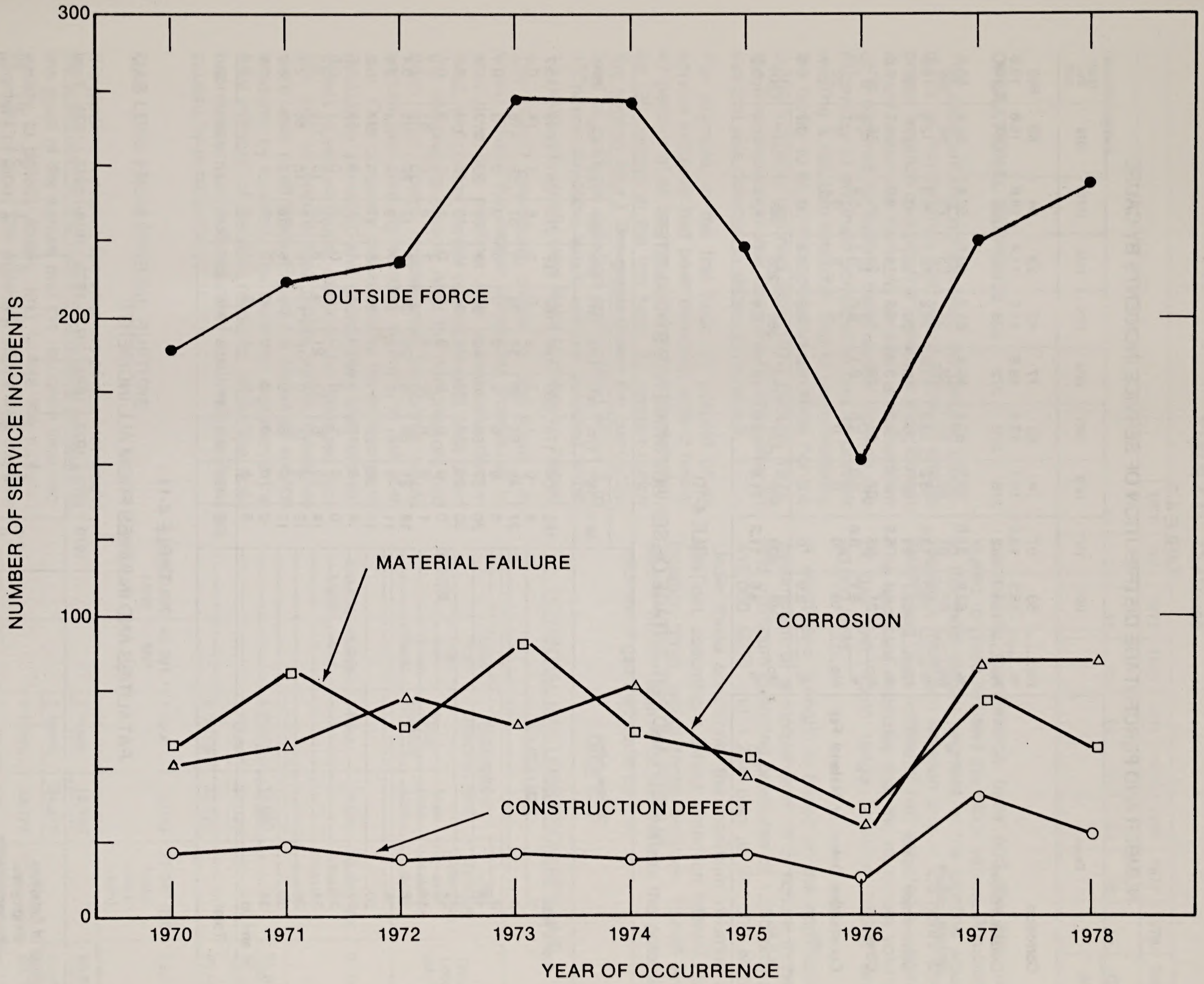



FIGURE 4-4. CAUSES OF SERVICE INCIDENTS

TABLE 4-9

NUMBER AND PERCENTAGE DISTRIBUTION OF SERVICE INCIDENTS BY CAUSE

| Cause | | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | Total/ Percent |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Corrosion | No..... | 53 | 57 | 74 | 63 | 77 | 42 | 29 | 84 | 83 | 562 |
| | %..... | 15.3 | 13.9 | 18.1 | 13.4 | 16.8 | 11.5 | 11.4 | 18.8 | 18.6 | 15.6 |
| Outside Forces | No..... | 183 | 212 | 218 | 272 | 272 | 226 | 152 | 226 | 243 | 2,004 |
| | %..... | 52.9 | 51.8 | 53.3 | 57.7 | 59.4 | 61.7 | 59.6 | 50.4 | 54.4 | 55.5 |
| Material Failure | No..... | 57 | 81 | 62 | 91 | 62 | 52 | 35 | 73 | 56 | 569 |
| | %..... | 16.5 | 19.8 | 15.2 | 19.3 | 13.5 | 14.2 | 13.7 | 16.3 | 12.5 | 15.8 |
| Construction Defect | No..... | 22 | 24 | 18 | 20 | 18 | 20 | 12 | 40 | 27 | 201 |
| | %..... | 6.4 | 5.9 | 4.4 | 4.2 | 3.9 | 5.5 | 4.7 | 8.9 | 6.0 | 5.6 |
| Other | No..... | 21 | 35 | 37 | 25 | 28 | 24 | 21 | 25 | 35 | 251 |
| | %..... | 6.1 | 8.6 | 9.0 | 5.3 | 6.1 | 6.6 | 8.2 | 5.6 | 7.8 | 7.0 |
| Construction Defect or Material Failure | No..... | 10 | 0 | 0 | 0 | 1 | 2 | 6 | 0 | 3 | 22 |
| | %..... | 2.9 | 0 | 0 | 0 | 0.2 | 0.5 | 2.4 | 0 | 0.7 | 0.6 |
| TOTAL | No..... | 346 | 409 | 409 | 471 | 458 | 366 | 255 | 448 | 447 | 3,609 |
| | %..... | 9.6 | 11.3 | 11.3 | 13.1 | 12.7 | 10.1 | 7.1 | 12.4 | 12.4 | 100.0 |

TABLE 4-10

NUMBER AND PERCENTAGE OF SERVICE INCIDENTS BY DIAMETER

| Diameter, inches | Number of Service Incidents | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | Total | Percent |
| 6 and less | 165 | 204 | 179 | 209 | 192 | 162 | 127 | 210 | 201 | 1,649 | 45.7 |
| 7 | 4 | 0 | 1 | 2 | 2 | 0 | 0 | 6 | 1 | 16 | 0.4 |
| 8 | 37 | 48 | 51 | 56 | 54 | 38 | 26 | 51 | 55 | 416 | 11.5 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 0.1 |
| 10 | 20 | 27 | 33 | 40 | 40 | 30 | 22 | 32 | 33 | 277 | 7.7 |
| 12 | 30 | 26 | 38 | 28 | 48 | 34 | 19 | 43 | 48 | 314 | 8.7 |
| 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0.1 |
| 14 | 1 | 9 | 6 | 12 | 4 | 7 | 7 | 9 | 6 | 61 | 1.7 |
| 16 | 18 | 21 | 29 | 35 | 20 | 21 | 15 | 13 | 23 | 195 | 5.4 |
| 18 | 11 | 8 | 11 | 17 | 14 | 15 | 7 | 8 | 13 | 104 | 2.9 |
| 20 | 14 | 32 | 23 | 31 | 31 | 25 | 15 | 29 | 24 | 224 | 6.2 |
| 22 | 4 | 8 | 10 | 5 | 9 | 4 | 1 | 5 | 8 | 54 | 1.5 |
| 23 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.0 |
| 24 | 14 | 10 | 8 | 21 | 21 | 9 | 3 | 19 | 13 | 118 | 3.3 |
| 26 | 12 | 2 | 12 | 3 | 18 | 10 | 6 | 7 | 16 | 86 | 2.4 |
| 30 | 11 | 9 | 5 | 9 | 4 | 6 | 6 | 10 | 3 | 63 | 1.7 |
| 34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.0 |
| 36 and up | 5 | 5 | 2 | 3 | 1 | 5 | 1 | 2 | 1 | 25 | 0.7 |
| Total | 346 | 409 | 409 | 471 | 458 | 366 | 255 | 448 | 447 | 3,609 | 100.0 |

TABLE 4-11

FATALITIES AND INJURIES FROM ALL INCIDENTS

| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Number of Fatalities | | | | | | | | | | |
| Employees | 1 | 2 | 3 | 1 | 1 | 5 | 1 | 5 | 1 | 20 |
| Nonemployees | 0 | 1 | 3 | 1 | 3 | 2 | 6 | 3 | 0 | 19 |
| | | | | | | | | | | 39 |
| Number of Injuries | | | | | | | | | | |
| Employees | 11 | 14 | 23 | 3 | 7 | 10 | 22 | 10 | 15 | 115 |

TABLE 4-11—Continued

| | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Nonemployees | 13 | 10 | 14 | 16 | 14 | 11 | 23 | 16 | 15 | 132 |
| | | | | | | | | | | 247 |

## OPERATIONAL RESPONSE

The applicant has not identified the detailed procedures its maintenance staff would follow to ensure proper isolation of a pipeline rupture or leak. Except in rare instances, the rapid isolation and shutdown of a ruptured or leaking transmission pipeline are necessary to eliminate combustible gas, to prevent wasting a valuable resource, and to begin restoring the facility to its normal operating condition. For the 3,609 incidents reported from 1970 through 1978, the time required to shut down the facilities after an incident was detected is shown in figure 4-5.

For example, in the first hour, 25 percent of all service incidents had been detected; after 2 hours, 47 percent of all service incidents had been detected (25 percent in the first hour, 22 percent during the second hour.) The graph shows the cumulative total of incidents detected and isolated within 3 to 13 hours. Incidents which are not detected within 13 hours are usually slow leaks or unknown losses.

The RMPC operations center in Salt Lake City would initiate the proper sequential procedures to shut down the pipeline. After a leak was discovered, the control center operator would shut down the compressor station. After the compressors had been shut down, maintenance personnel would secure the area by sending workers to the leak site. One company official would be in charge of evaluating, planning, and coordinating leak site activities to ensure proper repair of the damaged section and to ensure that proper safety measures were used at all times. Figure 4-6 shows all service incidents by location. The clear bar represents the total number of service incidents, while the solid bar represents only the number of service incidents caused by outside force.

## GAS LOSS FROM PIPELINE RUPTURE

If a pipeline ruptured, the volumes of gas lost would be a function of the pipeline operating pressure at the point of the rupture and the response time necessary to detect, locate, and isolate the ruptured segment of pipe. The applicant states that the time required to isolate a ruptured segment of the pipeline following detection of the rupture would depend upon the travel time to the block valves from the appropriate maintenance base and the time required to close (isolate) the block valves. A rupture in the most distant segment of the pipeline would require a maximum isolation time of 2.6 hours after RMPC had been notified or had detected a rupture. The applicant estimates that the maximum volume of gas lost would range between 73,000 and 90,000 Mcfd.

A worst-case scenario is based on the applicant's assumption of a rupture area of 5 square inches and maximum operating pressures of 1,235 psig at 413,000 Mcfd and 1,244 psig at 800,000 Mcfd. Under these conditions, the maximum volumes of gas lost, assuming a 2-hour detection interval (not isolation time), would range between 75,898 and 80,517 Mcfd. Table 4-12 summarizes the potential volumes of gas that could be lost.

TABLE 4-12

POTENTIAL GAS LOSS FROM PIPELINE RUPTURE

| Volume | Loss From Rupture (Line Pack) | Loss Before Detection (Mcf) | | Loss Between Detection and Isolation (Mcf) | Total Loss (Mcf) |
|---|---|---|---|---|---|
| | | Time Elapsed | Volume Lost | | |
| 413,000 Mcfd | 38,958 Mcf | 1 hour | 8,030 | 20,880 (2.6 hours maximum) | 67,868 |
| | | 2 hours | 16,060 | | 75,898 |
| | | 3 hours | 24,090 | | 83,928 |
| | | 4 hours | 32,120 | | 91,958 |
| 800,000 Mcfd | 43,291 Mcf | 1 hour | 8,043 | 21,040 (2.6 hours maximum) | 72,424 |
| | | 2 hours | 16,186 | | 80,517 |
| | | 3 hours | 24,279 | | 88,610 |
| | | 4 hours | 32,372 | | 96,703 |

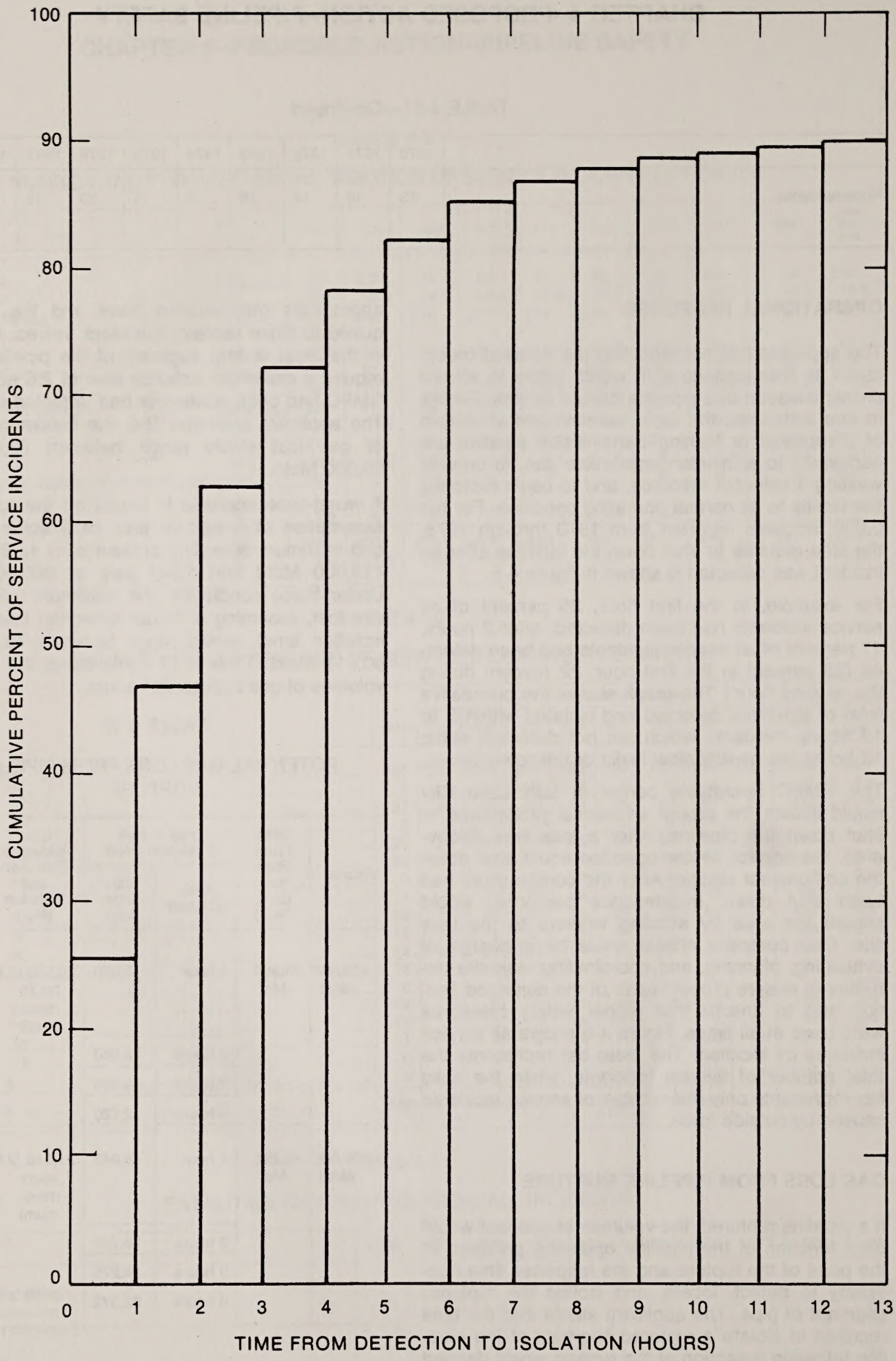



FIGURE 4-5. ELAPSED TIME TO ISOLATION OF PIPELINE LEAKS, 1970-1978

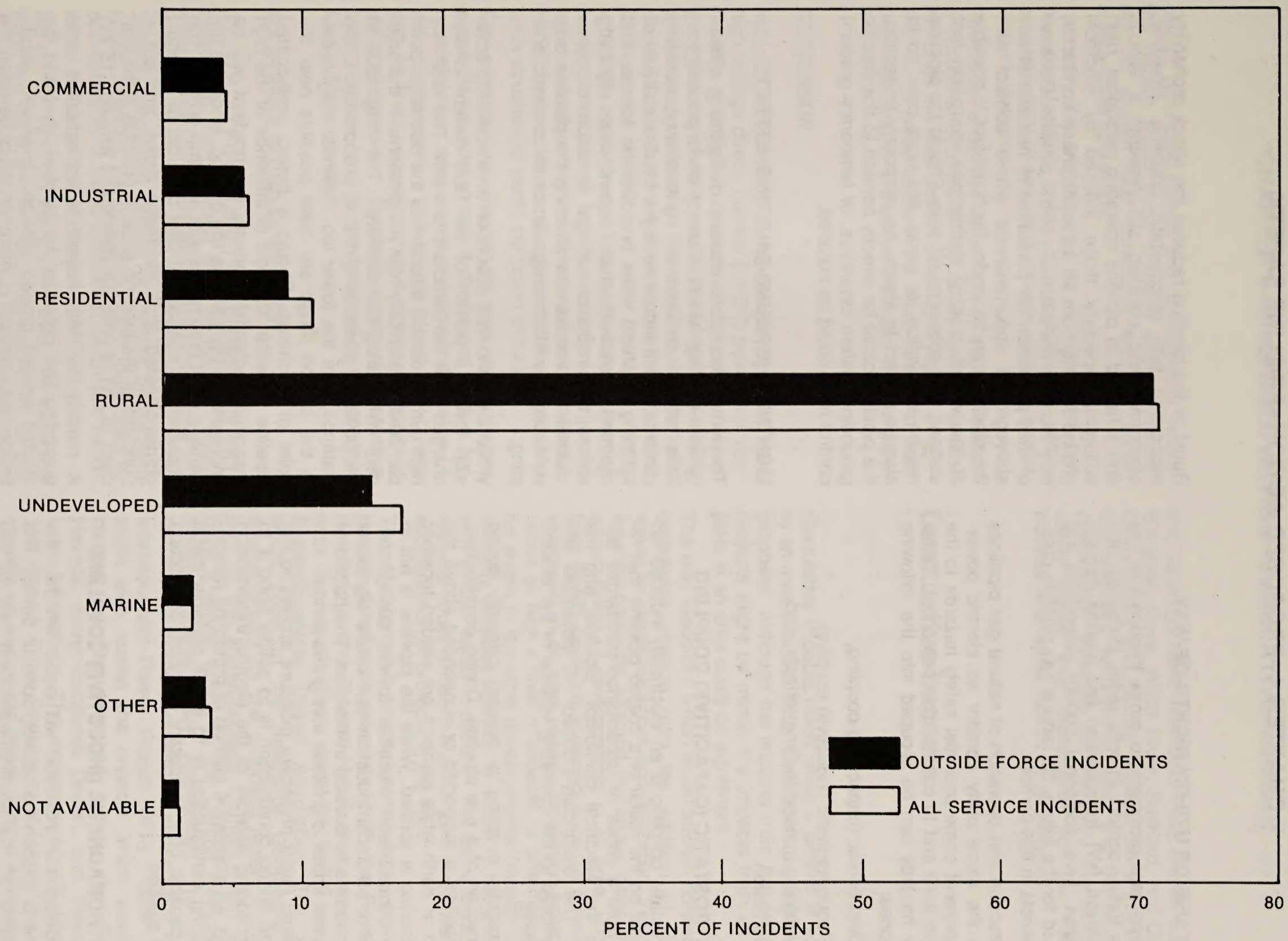



FIGURE 4-6. DISTRIBUTION OF SERVICE INCIDENTS BY AREA

## JOINT USE OF UTILITY RIGHTS-OF-WAY

The applicant proposes to cross through the Las Vegas Valley corridor (1 mile wide). Presently, one 500-kilovolt (kV) transmission line passes through this area. Five additional 500-kV powerlines are planned for the future. No natural gas pipeline presently exists in this corridor.

Construction and operation of natural gas pipelines within the same utility corridor as electric powerlines present some potential safety hazards to the pipeline itself and to construction personnel. These safety hazards can be grouped into the following categories:

Electrostatic (capacitive) coupling,

Electromagnetic (inductive) coupling,

Lightning (ground-faulting) effects, and

Corrosion.

## ELECTROSTATIC (CAPACITIVE) COUPLING

Electrostatic coupling is an electrically induced AC potential on the metal of a coated pipeline that results from a series of capacitance discharges between the electrical conductor, pipeline, and the earth. The electrically-induced AC potentials are proportional to the operating voltage of the electric powerline.

Electrostatic coupling is present primarily during construction of a gas pipeline. During construction, the pipeline is supported or suspended above the trench or earth while sections are welded together and coating is applied. While the pipeline is not in direct contact with electrical towers during construction, electrical induction can cause significant AC potentials to develop in the pipe. The hazard of personnel shock is greatest during this period.

The most direct protective measure applied to the pipeline during construction is to solidly bond it to the grounding network of the electric transmission system. An alternative method of protecting personnel during construction is to install portable metal mats capable of a temporary electrical connection to the pipeline.

## ELECTROMAGNETIC (INDUCTIVE) COUPLING

Electromagnetic induction will occur whether the pipeline is suspended aboveground or buried. The magnitude of the electromagnetically-induced AC potential in a specific situation is a function of the length of parallelism, the magnitude of the electric circuits, the distance between conductors, phase currents, the leak resistance of the pipeline to earth, and other factors such as soil resistivity.

Burial of the pipeline reduces the shock probability associated with electrostatic coupling. However, electromagnetic coupling still presents a serious shock hazard to pipeline operating personnel. High voltages, especially those induced by electrical ground faulting from an adjacent phase conductor, may increase the electricity in the pipeline. Because of this, protection for personnel is required at any aboveground appurtenances where contact with the pipeline can be made. Such contact is possible at line valves, pigging installations, corrosion test stations, and aboveground pipe. Should the pipeline require excavation for repair, the work crew could also be subject to shock. As temporary protection, the pipeline could be directly bonded to the electric grounding system structures, or temporary gradient control mats could be installed.

## LIGHTNING (GROUND-FAULTING) EFFECTS

There are two main classes of lightning effects (ground-faulting) which influence underground pipelines located on common rights-of-way: transient currents, which induce voltages by direct strikes of lightning to shield wires or powerline towers, and lightning flashover, which occurs when lightning strikes the insulation strings. In each of these classes, the mechanism affecting the pipeline may be caused by electromagnetic or electrostatic coupling.

When a ground-fault occurs on an electric transmission tower, a portion of the fault current is discharged from the structure to earth. The relatively high current density adjacent to the discharge point can create potentially high AC gradients in the adjacent soils during the discharge. The magnitude to the potential gradients is directly proportional to the distance from the tower leg. Potential magnitudes in the kilovolt range are quite possible near the point of discharge. Should a buried, well-coated pipeline be within the field of influence of the high magnitude potential gradient, the gradient will be impressed directly across the coating, since the underlying steel pipe represents an earth ground. The possibility of coating damage because of potential gradient-heated arcs, discharge paths, and actual puncture of the pipeline steel is possible if the gradient (a unit of potential difference) exceeds 15 kV.

A remedy for this hazard is to establish solid grounding ties between the pipeline steel and the electric system ground network. However, establishing solid grounding interconnectors between the pipeline and electric system drastically increases the cathodic protection current required to obtain proper corrosion mitigation of the coated steel pipeline. As an alternative to direct interconnections, lightning arrestors can be installed between the

electric grounding system and pipeline steel, where the hazard would occur primarily under transient electric system fault conditions and not under steady-state operations.

However, the presence of an AC powerline can provide shielding if line stroke collection width, available right-of-way, and pipeline location are all properly designed.

Powerlines along the same right-of-way can actually reduce effects caused by direct lightning strikes. Although the near strike frequency is higher, powerline shield wires capture the more severe strikes, thus providing a 'protective umbrella' for the pipeline.

### CORROSION

Induced AC corrosion of natural gas pipelines from high voltage direct- current (HVDC) powerlines represents a potential operational hazard to natural gas pipelines sharing joint rights-of-way. An HVDC system may operate so that continuous or periodic direct electric current follows an earth path circuit between the HVDC and other metallic objects within the right-of-way. This earth current (termed 'stray current') tends to follow metallic underground structures which are not directly associated with the HVDC system. Where direct current flows from any such structure to earth, corrosion occurs.

For example, one ampere per year can consume about 20 pounds of iron if discharged from a ferrous structure such as an underground pipeline. A natural gas pipeline that shares a joint right-of-way with an HVDC powerline has a higher probability of induced corrosion. Therefore, a cathodic protection system would have to be designed to compensate for the higher levels.

### MX MISSILE SITING CONFLICTS

The U.S. Air Force (USAF) was contacted for information on the proposed siting of the MX missile system. The USAF indicated that the routing of the proposed RMPP would not pass through any of the current conceptual layouts of the MX deployment areas. However, the proposed RMPP route does lie approximately 2 miles southwest of an MX candidate operating base southwest of Milford, Utah.

No conflict with the MX system would be expected from the Northern Systems Alternative. All of the candidate missile sites are located south of the alternative. Also, no conflicts are expected to develop with the West Salt Lake Alternative. The majority of its route would follow the RMPP. However, the Central Nevada Alternative would pose numerous potential conflicts. It would cross the following MX candidate sites: Whirlwind, Tule, Snake, Spring, Steoptoe, Cave, White River, Railroad, Hot Creek, Stone Cabin, and Ralston Valleys. Since the USAF has identified no preferred sites and the project's construction schedule is unknown, the potential safety issues that could arise for the Central Nevada Alternative cannot be determined.

## Cumulative Impacts

Cumulative impacts result when a project is added to an area in which other developments exist or are proposed. Although the impacts from the separate projects might be minor, the impacts from all projects in an area could be significant.

The only resources which would sustain noteworthy cumulative impacts from the addition of RMPP would be visual resources and recreation. Visual resources could be affected in various ways by an accumulation of developments in an area. Impacts from RMPP could be lessened because a new development in an area already developed would not cause as high a level of impacts, or attention could be drawn to the other developments. Impacts could intensify because attention is drawn to two projects with similar visual impacts in the same area, and impacts could remain the same as if there were no accumulation of projects in the area.

The aboveground structures and large areas of ground disturbance associated with the Roosevelt Hot Springs and Thermal Hot Springs, would minimize the visual effects from the RMPP and the Sevier-Escalante Desert Alternative. The same would occur at the Newcastle Geothermal Resource project for the proposed action. Construction of the Martin-Marietta Cement Plant would have a similar effect on the Central Nevada and Sevier-Escalante Desert Alternatives. The ground disturbance associated with the construction of the Intermountain Power Project (IPP) Power Plant might also lessen the impacts which would be caused by the proposed action, the Central Nevada, Sevier-Escalante Desert, and West Salt Lake Alternatives. The expansion of U.S. Highway 189 through Provo Canyon could lessen the visual impacts caused by the Provo Canyon Alternative.

If they closely parallel each other, the Moon Lake Project transmission line would draw attention to the visual impacts associated with the RMPP and the Mill Creek Variation by emphasizing the linear nature of the pipeline right-of-way.

The proposed action, and to a lesser extent, the East Las Vegas Variation of the RMPP, would further reduce the quality of recreation in the Rainbow Gardens and the proposed Clark County Wetlands park by adding yet another linear project to the two utility lines which currently exist, the Navajo-McCullough Powerline and the Southern Nevada Water Project. The IPP is another transmission line being proposed which would further lessen the natural and scenic quality of the area.

Implementation of the project could potentially destroy some unknown subsurface historical or archaeological remains. There could be a loss of knowledge because any sites excavated as a result of the project would be precluded from future scientific studies employing techniques not yet developed.

The various stream crossings would disturb both the stream bed and the stream banks resulting in a small amount of additional sediment being added to the streams.

## Unavoidable Adverse Impacts

The construction and operation of the proposed pipeline project and all alternatives and variations would result in several impacts that would remain after mitigation. These unavoidable adverse impacts include the following.

Some wildlife and aquatic animals would be lost during the construction phase of the project during right-of-way clearing, and construction at stream crossings. These losses would be unavoidable since these species have a small home range and are not mobile. Illegal collection of desert tortoises would be an unavoidable, causing adverse impacts to populations of this rare animal. The loss of woodland habitat for the life of the project would also be unavoidable and a slight impact would occur to forest-dwelling animals.

Accelerated erosion would occur along the right-of-way during construction. Project construction would result in an unavoidable loss of crop production for one growing season and the disruption of farming operations where the right-of-way would cross croplands.

The visual resource would be unavoidably affected to varying degrees depending upon the number and location of aboveground permanent structures such as compressor stations and maintenance bases along the various routes. Vegetation and land form changes along the routes which would also affect the visual resources could not be avoided.

## Irreversible/Irretrievable Commitment of Resources

Construction and operation of the proposed pipeline project and all alternatives and variations would result in either the irreversible or irretrievable commitment of certain resources. An irreversible commitment of a resource is one which cannot be changed once it occurs; whereas an irretrievable commitment means the resource cannot be recovered or reused.

Cultural resources which are accidentally destroyed or which are salvaged prior to construction are irreversibly and irretrievably lost.

## Relationship Between Short-term Uses of Man's Environment and the Maintenance and Enhancement of Long-term Productivity

Short term is defined for this project as the 20-year lifetime of the proposed pipeline. Neither the proposed pipeline nor any of the alternatives or variations would decrease the long term productivity of the environment and resources which it would cross.

# ALTERNATIVE A--NORTHERN SYSTEMS ALTERNATIVE

## Vegetation

The Northern Systems Alternative would affect between 931 acres (best case) and 1,662 acres (worst case) of vegetation. Of this acreage, the understory would be capable of returning to preconstruction densities within 5 years after completion of construction. The overstory would require longer, as already described for the proposed action.

The acres of vegetation which would be temporarily removed by the Northern Systems Alternative are shown in table 3-1. Approximately 2 acres of riparian vegetation would be temporarily lost in the best-case evaluation, 8 acres in the worst case. There would be a loss of 30 acres (10 miles) of forest, pinyon-juniper, and mountain brush vegetation in an

approximately 25-foot wide segment over the pipeline for the life of the project (20 years) for both the best and worst case.

Joshua trees and various species of cacti occur scattered throughout the creosote bush vegetation type; 312 acres of potential Joshua tree and cacti habitat would be crossed by the best-case and 339 acres by the worst-case situation. For a description of the impact potential, refer to the discussion of each vegetation type in the discussion of vegetation for the proposed action.

## Wildlife

### BEST CASE

Except for the order of magnitude (determined by miles of range crossed), the best-case impacts to the various big game animals found along the Northern Systems Alternative (mule deer, American elk, pronghorn, and moose) would be the same as those noted for the proposed action. This alternative would cross 27 miles (327 acres) of big game winter range. The type of impact (i.e., harassment) would be the same as that detailed for the proposed route.

Impact to sage grouse would occur along about 17 miles (206 acres) of habitat on the alternative route. Ring-necked pheasants could be affected on about 43 miles (521 acres) of cropland along this alternative. Gambel's quail would not be found along this alternative. Waterfowl habitat in this area would include approximately 30 percent more acres than would be found along the proposed action (41 miles or 497 acres versus 34 miles or 412 acres). Raptor habitat would occur along an estimated 54 miles (654 acres) of the Northern Systems Alternative.

### WORST CASE

The worst-case impact to big game mammals would be the same as that for the best case because there are no big game winter ranges in the California portion of the worst-case route.

This alternative would affect an estimated 17 miles (206 acres) of sage grouse habitat. The types of impacts would be the same as those noted for the proposed action. Ring-necked pheasants would be found along approximately 88 miles (1,065 acres) of cropland along this alternative. The types of impacts to pheasants would be the same as those noted for the proposed action. Gambel's quail do not occur along this alternative route. The types of impacts to waterfowl habitat under this case would be the same as those noted for the proposed action and would occur along 57 miles or 691 acres. The types of impacts to raptors from this alternative would be the same as those noted for the proposed action and would occur along 174 miles or 2,109 acres.

### FEDERAL AND STATE LISTED SPECIES

Except for on the order of magnitude, impacts to the black-footed ferret and the bald eagle would be the same as those detailed for the proposed action. The San Joaquin kit fox could be affected if construction machinery destroyed its dens, if it were shot by construction workers, or if it were involved in motor vehicle accidents caused by increased traffic during construction.

Impacts to the blunt-nosed leopard lizard would include direct mortality to animals crushed by machinery or destruction of occupied dens or resting areas. These impacts are not quantifiable with present knowledge.

## Soils

The best-case Northern Systems Alternative would disturb 937 acres of soils. The following amounts per category would be most strongly affected by the project: 36 acres of Soil Group 1, 315 acres of Soil Group 4, 85 acres of Soil Group 5, 158 acres of Soil Group 6, 145 acres of Soil Group 9.

The worst-case Northern Systems Alternative would disturb 2,728 acres of soils. The following amounts per category would be most strongly affected: 36 acres of Soil Group 1, 315 acres of Soil Group 4, 121 acres of Soil Group 5, 594 acres of Soil Group 6, 24 acres of Soil Group 8, and 497 acres of Soil Group 9. Refer to the discussion of the proposed action section in this chapter and table 3-9 for additional soil information.

## Visual Resources

No significant adverse visual resources would be affected along the Northern Systems Alternative right-of-way. However, an analysis of the impacts which may occur as a result of constructing ancillary facilities indicates that the Stanfield Compressor Station will create a significant adverse visual impact as described in table 4-13.

TABLE 4-13

SIGNIFICANT ADVERSE VISUAL RESOURCE IMPACTS OF THE NORTHERN SYSTEMS ALTERNATIVE

| MP | Affected Landscape Feature[1] | Critical Viewpoint[2] | Duration of Impact[3] | Contrast Rating Feature Score[4] | VRM Class and/ or VQO[5] |
|---|---|---|---|---|---|
| **PIPELINE** | | | | | |
| No Significant adverse visual resource impacts. | | | | | |
| **ANCILLARY FACILITIES** | | | | | |
| Stanfield, OR Vicinity | Vegetation, structure ..... | rural homes and roads ..... | Long Term ..... | -/15/29 | 4 |

[1]The composition of the characteristic landscape would be modified by changing the landform, water form, or vegetation or by adding a structure to the landscape.

[2]A critical viewpoint is the point where the proposed change would be most apparent.

[3]Duration of impact can be described as:
Temporary--During construction through first or second growing season.
Short term--For 2 to 5 years following construction.
Long term--5 years to project life to (20 years) or longer.

[4]Contrast Rating Feature Score is a value which the contrast of a specific area could not exceed without creating a significant adverse visual impact. VRM Class 2 and VQO R both have a Feature Score of 12. VRM Class 3 and VQO PR both have a Feature Score of 16. VRM Class 4 and VQO M,MM both have a Feature Score of 20. See appendix I for further explanation.

[5]See table 3-10 for definitions of terms.

## Land Uses: Agriculture

The best case of the Northern Systems Alternative would temporarily disturb 521 acres of cropland. The cropland would be successfully restored within 1 to 2 years if the revegetation and restoration guidelines identified in appendix C were implemented.

The worst case of the Northern Systems Alternative pipeline right-of-way would temporarily disturb 1,065 acres of cropland. With the possible exception of the two orchard and vineyard areas in the Brentwood-Panoche segment near MP 31 and MP 93, the cropland would be successfully restored within 1 to 2 years. Impact to the orchard and vineyard areas would be significant because of the time required to restore production to preconstruction conditions and the requirement that trees not be allowed within an approximately 25-foot wide strip over the pipeline. However, the right-of-way could be aligned to minimize this impact.

## Socioeconomics

The worst-case alternative could be constructed by two pipeline spreads and five compressor station construction crews. Spread 1 (320 workers) would construct the pipeline loops in Wyoming, Utah, and Idaho; spread 2 (290 workers) could construct the pipeline segments in California. Construction in California might not be required; however, the worst-case analysis assumes it would be. (See chapter 2 and table 2-4 for further information on the need for California construction.) The compressor station construction crews would probably be smaller than the Sage Compressor Station crew, since all but one of the alternative compressors would only be additions to existing stations, much smaller than the Sage Compressor Station. Compressor station construction would require 15 persons in the first month, 60 persons during the peak 2-month period, and 15 persons for the remaining month of construction. Therefore, if all construction occurred simultaneously, 910 workers would be employed during the peak construction period. The best-case alternative would not require constructing pipeline in California. The peak construction work force for the best case would be 620. Existing maintenance bases would be used for both the worst and best cases.

Both pipeline spreads would be divided into two work crews. During peak construction, spread 1 would have 252 working on the right-of-way and 67 working in a double-jointing yard; spread 2 would have 229 working on the right-of-way and 61 working in a double-jointing yard.

Population and employment increases that would occur during construction of the alternative pipeline would be minor, no more than 0.33 and 0.75 per-

cent, respectively, for both pipeline spreads. Increases in retail sales would be correspondingly small, less than 1 percent. However, spread 1 pipeline workers would use a significant portion of existing accommodations during the 3 peak months; 11 percent of the hotel/motel rooms and 21 percent of the campsites would be needed. This would probably inconvenience other travelers and campers. Spread 2 would use less than 4 percent of existing accommodations.

Population and employment increases that would occur during construction of all compressor stations would be 1.2 percent or less. Increases in retail sales would be correspondingly small; the largest increase--about 1.19 percent--would occur at the Madras Compressor Station in Oregon. Three of the compressor crews--Stanfield, Ione, and Bonanza--would require only 4 percent of existing hotel/motel rooms, but they would need 11 to 29 percent of the campsites. This would probably inconvenience other campers. The Madras Compressor Station crew would need 52 percent of the local hotel rooms; the Delevan Compressor Station crew would need more rooms than exist in nearby towns. Construction personnel for the Delevan Compressor Station could find housing 70 miles away in Sacramento, but the Madras Compressor Station crew would probably try to live near the site because there is virtually nowhere else within a reasonable driving distance. This would probably absorb all of the local vacancies and inconvenience other travelers who would expect to stay in the area.

The labor requirements of the RMPP suggest that the operation work force for the Northern Systems Alternative would require, at most, five additional employees at the Stanfield Compressor Station. It is possible to operate a compressor of this size remotely, in which case no additional workers would be required. The existing maintenance bases might need additional personnel to maintain the proposed looping, although existing personnel might be able to handle the incremental increase. At most, the existing maintenance bases would not need more than a few additional employees. Other than this, existing personnel could operate the additional facilities.

## Topography

For both cases of the Northern Systems Alternative, only about 1 mile of sidehill construction, located between MP 38 and MP 39 on the Pegram Loop, might be necessary.

## Noise Quality

Noise resulting from the operation of compressor stations is principally a function of source characteristics (number and horsepower of compressor units, number of blowdowns, suction inlet pressure, and the direction of the receptor from the source).

Although the construction of a 400-hp. compressor station at Stanfield, Oregon, for the Northern Systems Alternative would affect the local environment, the exact impact cannot be quantified because the exact location of this station is undetermined. New compressor units similar to those at the existing compressor stations along the PGT and PG&E transmission systems would be installed with noise suppression equipment designed to meet the latest noise level limits in effect when they are purchased. Assuming that the same type of units are installed at each compressor station, doubling the compressor station horsepower would not double the noise level. According to the addition principle of acoustics, two equal sources at the same location would produce a sound level 3 dB(A) higher than the original noise level. The impact on noise quality would be the same for the best and worst cases of this alternative.

## Air Quality

### CONSTRUCTION-RELATED IMPACT

During construction of the looping, compressor station modifications, and ancillary facilities, pollutant emissions would depend upon the type and amount of equipment used and the extent of its use. The worst case would create more temporary unquantified impact on air quality than the best case, since it would require more pipeline construction. Generally, the emissions resulting from pipeline construction and compressor station modifications include HC's, $NO_x$, CO, $SO_x$, TSP, and water vapor. Concentrations of pollutants would depend on relative locations of construction; dispersion would depend upon local atmospheric stability and meterological conditions.

Construction would cause temporary and minimal deterioration of the ambient air quality. Localized, short-term dust conditions produced by construction could create a temporary nuisance in dry and windy weather. The most likely place for this impact would be Bannock County, Idaho. Additional construction-related impact would be similar to that from the RMPP.

# CHAPTER 4--NORTHERN SYSTEMS ALTERNATIVE

## OPERATIONAL IMPACT

The operational impact of the Northern Systems Alternative, the same for both cases, would depend upon the volumes of gas transported through it. All of the compressor stations along this alternative use natural gas as their fuel source.

Operation of the 400-hp. compressor station at Stanfield, Oregon, would cause only minor impact to the existing air quality because only 5 tons of $NO_x$ and 2 tons of CO would be emitted per year. Maximum ground- level concentrations from operation of the Stanfield Compressor Station would be negligible--far below an annual arithmetic mean of 1 ug per cubic meter. No PSD review would be necessary because the Stanfield Compressor Station would not be considered a major source.

The addition of 8,975 hp. at the Ione Compressor Station, 1,450 hp. at the Madras Compressor Station, 1,375 hp. at the Bonanza Compressor Station, and 8,750 hp. at the Delevan Compressor Station to transport both RMPP and Alaskan gas would increase emissions to the levels shown in table 4-14. The addition of compressor units at any of the existing compressor stations would constitute a major modification under the PSD-State Implementation Plan *de minimis* regulations (issued by EPA August 7, 1980) if total emissions of $NO_x$ (primary pollutant) exceeded 40 tons per year. Additional compression eventually installed at the Ione Compressor Station in Morrow County, Oregon, and the Delevan Compressor Station in Colusa County, California, to transport RMPP and Alaskan gas would require a PSD review. However, if the EPA had conducted a PSD review for any of these sources before their construction, an additional PSD review might not be necessary, since a source is allowed to expand to the limits of its operational air permits without further review.

To transport 800,000 Mcfd of RMPP gas along with the Alaskan gas volumes, 2,100 hp. would be added at Lava Hot Springs, 1,950 hp. at Burley, 400 hp. at Mountain Home, and 4,050 hp. at Stanfield along the Northwest pipeline system. Compression would also be added at all the compressor stations between Ione and Delevan along the PGT and PG&E systems. A PSD review would be required for the additions to the Burley and Mountain Home Compressor Stations; a PSD review would also be necessary for all of the additions to the compressor stations on PGT's and PGE's systems if they had not been examined in a previous review. The amount of horsepower added and the resulting increase in emissions are listed in table 4-14.

Increases in ground-level $NO_x$ and CO concentrations for all phases of the Northern Systems Alternative appear in table 4-15.

No impact on any Class I area is expected from the operation of the Northern Systems Alternative. Operating at the 800,000-Mcfd level, Diamond Junction Compressor Station 30 miles east of Crater Lake National Park, a Class I area, would increase $NO_x$ emissions by 19 ug per cubic meter. This would not significantly affect the Crater Lake National Park because of the easterly dispersion characteristics at the compressor station. The other Class I area near a Northern Systems Alternative facility is Whiskeytown National Recreation Area, 31 miles west of the Burley Compressor Station. The ground-level $NO_x$ increment from operation of the compressor station would be an annual arithmetic mean of 16.86 ug per cubic meter at 658 feet from the compressor station. The ground-level incremental impact from operation of the compressor station on this Class I area cannot be determined because the EPA-approved air dispersion models are only valid for up to 50 kilometers (EPA 1980a).

TABLE 4-14

EMISSIONS RESULTING FROM THE INCREMENTAL EXPANSION OF THE NORTHERN SYSTEMS ALTERNATIVE

| Gas Volume | Compressor Station | County/State | Required Horsepower (Totals) | Existing Horsepower | Additional Horsepower | [a]Existing Emissions at Time of Modification (Tons/Year) | | | | [a]Incremental Increase in Emissions (Tons/Year) | | | | PSD Review |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $NO_x$ | CO | HC's | $SO_2$ | $NO_x$ | CO | HC's | $SO_2$ | |
| Case I: 413,000 Mcfd | Stanfield | Umatilla, Oregon | 400 | 0 | 400 | 0 | 0 | 0 | 0 | 5 | 2 | .35 | - | No |
| Case II: 413,000 Mcfd plus 640,000 Mcfd Alaskan Gas | Ione | Morrow, Oregon | 50,207 | 41,232 | 8,925 | 524 | 199 | 36 | 0.72 | 113 | 43 | 8 | 0.15 | Yes |
| | Madras | Jefferson, Oregon | 30,690 | 29,240 | 1,450 | 371 | 141 | 26 | 0.51 | 18 | 7 | 1.0 | 0.03 | No |
| | Bonanza | Klamath, Oregon | 35,999 | 34,624 | 2,375 | 440 | 167 | 30 | 0.61 | 30 | 11 | 1.0 | 0.04 | No |
| | Delevan | Colusa, California | 41,700 | 32,950 | 8,450 | 419 | 159 | 29 | 0.57 | 107 | 42 | 8 | 0.10 | Yes |
| Case III: 800,000 RMPP Gas plus Alaskan Gas | Lava Hot Springs | Bancock, Idaho | 5,830 | 3,730 | 2,100 | 47 | 18 | 3 | 0.06 | 27 | 10 | 2 | 0.03 | No |
| | Burley | Cassia, Idaho | 7,950 | 6,000 | 1,950 | 632 | 81 | 254 | 0.10 | 204 | 28 | 83 | 0.03 | Yes |

TABLE 4-14—Continued

| Gas Volume | Compressor Station | County/State | Required Horsepower (Totals) | Existing Horsepower | Additional Horsepower | [a]Existing Emissions at Time of Modification (Tons/Year) | | | | [a]Incremental Increase in Emissions (Tons/Year) | | | | PSD Review |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $NO_x$ | CO | HC's | $SO_2$ | $NO_x$ | CO | HC's | $SO_2$ | |
| Case III: 800,000 RMPP Gas plus Alaskan Gas | Mountain Home | Elmore, Idaho | 6,400 | 6,000 | 400 | 631 | 81 | 254 | 0.10 | 204 | 26 | 83 | 0.03 | Yes |
| | Stanfield | Umatilla, Oregon | 4,450 | 400 | 4,050 | 57 | 21 | 4 | 0.67 | 51 | 20 | 4 | 0.07 | No |
| | Ione | Morrow, Oregon | 74,707 | 50,207 | 24,500 | 638 | 242 | 44 | 9 | 311 | 118 | 21 | 0.43 | Yes |
| | Kent | Sherman, Oregon | 45,732 | 38,482 | 7,250 | 489 | 185 | 34 | 0.67 | 92 | 35 | 6 | 0.12 | Yes |
| | Madras | Jefferson, Oregon | 45,340 | 30,690 | 14,650 | 390 | 148 | 27 | 0.53 | 186 | 71 | 13 | 0.25 | Yes |
| | Paulina | Deschutes, Oregon | 48,923 | 37,723 | 11,200 | 479 | 182 | 33 | 0.66 | 142 | 54 | 10 | 0.19 | Yes |
| | Diamond Junction | Klamath, Oregon | 44,054 | 36,054 | 8,000 | 458 | 174 | 36 | 0.63 | 102 | 39 | 7 | 0.14 | Yes |
| | Bonanza | Klamath, Oregon | 54,419 | 35,999 | 18,420 | 457 | 173 | 32 | 0.63 | 234 | 89 | 16 | 0.32 | Yes |
| | Tionesta | Modoc, California | 26,110 | 20,860 | 5,250 | 265 | 101 | 18 | 0.36 | 67 | 25 | 5 | 0.09 | Yes |
| | Burney | Shasta, California | 39,400 | 32,150 | 7,250 | 408 | 155 | 28 | 0.56 | 92 | 35 | 6 | 0.12 | Yes |
| | Gerber | Tehama, California | 33,170 | 23,720 | 9,450 | 301 | 35 | 6 | 0.12 | 120 | 46 | 8 | 0.16 | Yes |
| | Delevan | Colusa, California | 52,230 | 32,950 | 18,980 | 416 | 159 | 29 | 0.57 | 241 | 91 | 17 | 0.33 | Yes |

[a]Partculate matter emissions are negligible for natural gas fuel gas turbines.

TABLE 4-15

GROUND-LEVEL IMPACT RESULTING FROM OPERATION OF NORTHERN SYSTEMS ALTERNATIVE (ug Per Cubic Meter)

| Gas Volumes | Compressor Station | Background $NO_x$ | Additional $NO_x$[1] | Total $NO_x$ Ground-level Concentration[2] | Background CO | CO Impact[1] | Total CO Ground-level Concentration[2] |
|---|---|---|---|---|---|---|---|
| Case II: 413,000 Mcfd RMPP Gas Plus 640,000 Mcfd Alaskan Gas | Ione | 22 | 21.5 | 44.0 | 1-hour 1,156<br>8-hour 809 | 1-hour 100<br>8-hour 70 | 1,256<br>879 |
| | Madras | 22 | 13.13 | 35.00 | 1-hour 1,156<br>8-hour 809 | 1-hour 100<br>8-hour 70 | 1,256<br>879 |
| | Bonanza | 22 | 15.32 | 37.00 | 1-hour 1,156<br>8-hour 809 | 1-hour 117<br>8-hour 82 | 1,273<br>891 |
| | Delevan | 22 | 17.81 | 40.00 | 1-hour 1,156<br>8-hour 809 | 1-hour 135<br>8-hour 95 | 1,291<br>904 |
| Case III: 800,000 RMPP Gas plus Alaskan Gas | Lava Hot Springs | 22 | 2.50 | 24.50 | 1-hour 1,156<br>8-hour 809 | 1-hour 19<br>8-hour 13 | 1,175<br>822 |
| | Burley | 22 | 28.17 | 50.00 | 1-hour 1,156<br>8-hour 809 | 1-hour 72<br>8-hour 50 | 1,228<br>859 |
| | Mountain Home | 22 | 28.17 | 50.00 | 1-hour 1,156<br>8-hour 809 | 1-hour 72<br>8-hour 50 | 1,228<br>859 |
| | Stanfield | 22 | 2.09 | 22.00 | 1-hour 1,156<br>8-hour 809 | 1-hour 218<br>8-hour 20 | 1,184<br>829 |
| | Ione | 22 | 32.01 | 54.00 | 1-hour 1,156<br>8-hour 809 | 1-hour 242<br>8-hour 169 | 1,398<br>978 |
| | Kent | 22 | 19.64 | 42.00 | 1-hour 1,156<br>8-hour 809 | 1-hour 148<br>8-hour 133 | 1,304<br>942 |
| | Madras | 22 | 19.42 | 41.00 | 1-hour 1,156<br>8-hour 809 | 1-hour 147<br>8-hour 124 | 1,303<br>933 |

TABLE 4-15—Continued

| Gas Volumes | Compressor Station | Background $NO_x$ | Additional $NO_x$[1] | Total $NO_x$ Ground-level Concentration[2] | Background CO | CO Impact[1] | Total CO Ground-level Concentration[2] |
|---|---|---|---|---|---|---|---|
| Case III: 800,000 RMPP Gas plus Alaskan Gas | Paulina | 22 | 21.00 | 43.00 | 1-hour 1,156<br>8-hour 809 | 1-hour 159<br>8-hour 132 | 1,303<br>941 |
| | Diamond Junction | 22 | 19.00 | 41.00 | 1-hour 1,156<br>8-hour 809 | 1-hour 142<br>8-hour 99 | 1,298<br>908 |
| | Bonanza | 22 | 23.13 | 45.00 | 1-hour 1,156<br>8-hour 809 | 1-hour 177<br>8-hour 124 | 1,335<br>983 |
| | Tionesta | 22 | 11.19 | 33.00 | 1-hour 1,156<br>8-hour 809 | 1-hour 85<br>8-hour 60 | 1,241<br>869 |
| | Burney | 22 | 16.86 | 39.00 | 1-hour 1,156<br>8-hour 809 | 1-hour 128<br>8-hour 90 | 1,284<br>899 |
| | Gerber | 22 | 14.20 | 34.00 | 1-hour 1,156<br>8-hour 809 | 1-hour 284<br>8-hour 199 | 1,440<br>1,008 |
| | Delevan | 22 | 22.25 | 44.00 | 1-hour 1,156<br>8-hour 809 | 1-hour 170<br>8-hour 119 | 1,326<br>928 |

[1]All values were calculated by using EPA's approved PTMAX computer program.

[2]This ground-level concentration would occur 658 feet (200.5m) from the source.

# ALTERNATIVE B--SANPETE VALLEY ALTERNATIVE

## Vegetation

The Sanpete Valley Alternative would affect 6,215 acres of vegetation. The understory would be capable of returning to preconstruction densities within 5 years after completion of construction. The overstory would require longer than 5 years to reestablish, as described for the proposed action.

The acres of vegetation which would be temporarily or permanently removed by the Sanpete Valley Alternative are shown in table 3-1. There would be a loss of 869 acres of forest, pinyon-juniper, and mountain brush types in an approximately 25-foot wide segment over the pipeline for the life of the project (20 years). Approximately 19 acres of riparian vegetation would be temporarily lost. Various species of desert cacti and Joshua trees are scattered throughout creosote bush and saltbush-greasewood vegetation types; 2,194 acres of creosote bush would be crossed by the Sanpete Valley Alternative.

## Wildlife

### MAMMALS AND BIRDS

Big game winter ranges that would be crossed by the Sanpete Valley Alternative total an estimated 203 miles (2,460 acres). The types of impacts would be similar to those discussed for the proposed action.

This alternative would cross an estimated 59 miles (715 acres) of sage grouse range, about 75 miles (909 acres) of waterfowl habitat, and an estimated 102 miles (1,236 acres) of raptor habitat. The types of impacts for all of these bird habitat areas would be similar to those discussed for the proposed action.

### FEDERAL AND STATE LISTED SPECIES

If this alternative were chosen, impacts to black-footed ferrets would be identical to those identified for the proposed route, since the alternative would leave the proposed route south of the area where the proposed action could encounter this species. The alternative would affect the bald eagle in the same manner as the proposed action, although the order of magnitude could differ.

Impacts to the Utah prairie dog are not expected to occur, because none of its known distributions are in proximity to this alternative.

Impacts to the desert tortoise would be the same as those identified for the proposed action, since this alternative would rejoin the proposed action route north of known habitat for this species.

## Soils

The Sanpete Valley Alternative would disturb 7,636 acres of soils. Of this acreage, the following amounts by category would be most strongly affected: 1,382 acres of Soil Group 1, 255 acres of Soil Group 2, 412 acres of Soil Group 3, 61 acres of Soil Group 4, 570 acres of Soil Group 5, 206 acres of Soil Group 6, 170 acres of Soil Group 8, and 2,945 acres of Soil Group 9. Refer to the discussion of the proposed action and table 3-9 for additional soil information.

## Visual Resources

Similar to the proposed action, the significant adverse visual resource impacts caused by the Sanpete Valley Alternative would include contrasts in modifications of landform, vegetation, and the addition of structures, as noted in table 4-16. Refer to the proposed action discussion for a further explanation and to table 4-2 for a summary of impacts by VRM Class.

TABLE 4-16

SIGNIFICANT ADVERSE VISUAL RESOURCE IMPACTS OF THE SANPETE VALLEY ALTERNATIVE

| MP | Affected Landscape Feature[1] | Critical Viewpoint[2] | Duration of Impact[3] | Contrast Rating Feature Score[4] | VRM Class VRM and/ or VQO[5] |
|---|---|---|---|---|---|
| **PIPELINE** | | | | | |
| (Refer to proposed action discussion between MP 0 and MP 176)[6] | | | | | |
| MP 95-MP 105 | Landform, vegetation | U.S. Highway 89 | Long Term | 26/18/- | 2 |
| MP 121-MP 124 | Vegetation | U.S. Highway 89, Circleville | Long Term | -/22/- | 4 |
| MP 129-MP 131 | Landform, vegetation | U.S. Highway 89 | Long Term | 22/22/- | 3 |
| (Refer to proposed action discussion between MP 356 and MP 610)[6] | | | | | |
| **ANCILLARY FACILITIES** | | | | | |
| Same as those for the proposed action. | | | | | |

[1]The composition of the characteristic landscape would be modified by changing the landform, water form, or vegetation or by adding a structure to the landscape.

[2]A critical viewpoint is the point where the proposed change would be most apparent.

[3]Duration of impact can be described as:
Temporary--During construction through first or second growing season.
Short term--For 2 to 5 years following construction.
Long term--5 years to project life to (20 years) or longer.

[4]Contrast Rating Feature Score is a value which the contrast of a specific area could not exceed without creating a significant adverse visual impact. VRM Class 2 and VQO R both have a Feature Score of 12. VRM Class 3 and VQO PR both have a Feature Score of 16. VRM Class 4 and VQO M,MM both have a Feature Score of 20. See appendix I for further explanation.

[5]See table 3-10 for definitions of terms.

[6]Mileposts indicate where Alternative B would leave and rejoin the proposed action.

## Land Uses: Agriculture and Conflicts with Land Use Plans, Policies, and Controls

### AGRICULTURE

The Sanpete Valley Alternative route would temporarily disturb 1,585 acres of cropland. Assuming the implementation of the revegetation and restoration guidelines identified in appendix C, successful restoration of all croplands could be expected within 1 or 2 years.

The Sage Compressor Station would be located on native grazing land. Land use for the remaining surface facility sites is not known because specific locations have not yet been identified.

### CONFLICTS WITH LAND USE PLANS, POLICIES, AND CONTROLS

The Sanpete Valley Alternative, like the proposed action, would conflict with the Utility Corridor Rule of the proposed Forest Land Management Plan for the Uinta National Forest. It also would not follow the over 3,000-foot wide corridor administered by BLM through the 70,000 acres transferred from BLM administration to the Moapa Indian Reservation. See the discussion for the proposed action for the implications of these conflicts.

At this time, it is unknown whether or how the Sanpete Valley Alternative would conflict with the forthcoming (June, 1981) Draft Management Master Plan for the proposed Clark County Wetlands Park in southern Nevada.

## Socioeconomics

This alternative would parallel the RMPP route between MP 176 and MP 356. The employment and construction schedules would be the same as those for the proposed route. Table 2-3 lists the number of employees required to construct this alternative. The region of impact also would be similar to RMPP spreads 3 and 4. Regional socioeconomic impact would be insignificant. Local impact to towns nearer this alternative would also be minor, the main difference being that accommodations in these towns might be more desirable because of their proximity to the construction site. Table 4-17 lists the towns with accommodations that are within 20 road miles of the Sanpete Valley Alternative.

Operation and maintenance of this alternative would not differ from that of the proposed route. However, county property tax revenues would be different, as shown in table 4-4.

TABLE 4-17

TOWNS WITH HOUSING ALONG THE SANPETE VALLEY ALTERNATIVE

| Construction | Communities With Accommodations Within 20 Miles of the Pipeline | Communities With Accommodations 21 to 40 Miles from the Pipeline |
|---|---|---|
| Pipeline Spread 3 | Mt. Pleasant<br>Manti<br>Gunnison<br>Marysvale<br>Circleville<br>Richfield | Nephi<br>Beaver<br>Panguitch |
| Pipeline Spread 4 | Maryville<br>Circleville<br>Beaver<br>Parowan<br>Cedar City<br>St. George<br>Washington | Panguitch |

## Topography

The Sanpete Alternative would encounter about 8 miles of sidehill construction--about 6 miles in the canyon of the Sevier River south of Sevier and 2 miles between MP 129 and MP 131 in Circleville Canyon.

# ALTERNATIVE C--CENTRAL NEVADA ALTERNATIVE

## Vegetation

The Central Nevada Alternative would affect 9,149 acres of vegetation. The understory vegetation would be capable of returning to preconstruction densities within 5 years after construction was completed; the overstory vegetation would require longer, as described for the proposed action. Joshua trees and cacti (scattered within 4,713 acres of creosote bush and saltbush- greasewood vegetation types) could be affected. A loss of 715 acres of forest, pinyon-juniper, and mountain brush vegetation would occur for the life of the project (20 years). Approximately 20 acres of riparian vegetation would be temporarily lost.

## Wildlife

### MAMMALS, BIRDS, REPTILES, AND AMPHIBIANS

Big game winter ranges would be traversed by the Central Nevada Alternative for an estimated 131 miles (1,588 acres). This alternative would disturb an estimated 7 miles (85 acres) of desert bighorn sheep habitat.

This alternative would cross an estimated 66 miles (800 acres) of sage grouse habitat, 72 miles (873 acres) of waterfowl habitat, and 96 miles (1,164 acres), of raptor nesting and hunting habitat, and 2 miles (24 acres) of golden eagle nesting areas. Impacts to all of these areas would be the same as those noted for the proposed action.

This alternative would affect about 46 miles (558 acres) of desert tortoise range. Impacts would be the same as those for the proposed action.

### FEDERAL AND STATE LISTED SPECIES

Since this alternative would leave the proposed route south of where the RMPP would encounter the black-footed ferret, impacts to this species would be the same as those identified for the proposed action. Utah prairie dogs would not be affected by the Central Nevada Alternative because their distribution does not coincide with the alternative route.

Except for the order of magnitude, impacts to bald eagles would be the same as those discussed for the proposed action.

The Railroad Valley springfish could be affected by this alternative if its habitat at Big Spring near Lockes, Nevada, were to be disturbed. Any disturbance of this species' habitat would result in lowered production.

The Mohave ground squirrel, a state listed species, would suffer direct mortality and displacement into less favored habitats. Both of these impacts could reduce populations. Except for the order of magnitude, impacts to the state-listed desert tortoise would be the same as those noted for the proposed action.

## Soils

The Central Nevada Alternative would disturb 10,447 acres of soils. Of this acreage,,the following amounts would be most strongly affected: 1,236 acres of Soil Group 1, 897 acres of Soil Group 2, 1,963 acres of Soil Group 3, 800 acres of Soil Group 4, 485 acres of Soil Group 5, 461 acres of Soil Group 6, 97 acres of Soil Group 7, 218 acres of Soil Group 8, and 7,005 acres of Soil Group 9. Refer to the discussion of the proposed action and table 3-9 for additional soil information.

## Visual Resources

Similar to the proposed action, the significant adverse visual resource impacts for the Central Nevada Alternative would include contrasts from modifications of landform, vegetation, and the addition of structures, as noted in table 4-18. Refer to the proposed action discussion for a further explanation and to table 4-2 for a summary of such impacts by VRM Class and VQO.

TABLE 4-18

SIGNIFICANT ADVERSE VISUAL RESOURCE IMPACTS OF THE CENTRAL NEVADA ALTERNATIVE

| MP | Affected Landscape Feature[1] | Critical Viewpoint[2] | Duration of Impact[3] | Contrast Rating Feature Score[4] | VRM Class VRM and/or VQO[5] |
|---|---|---|---|---|---|
| **PIPELINE** | | | | | |
| (Refer to proposed action discussion between MP 0 and MP 176)[6] | | | | | |
| MP 109-MP 112 | Landform, vegetation | U.S. Highway 6/50 | Long Term | 26/18/- | 3 |
| MP 160-MP 163 | Vegetation | Swamp Cedar Natural Area | Long Term | -/25/- | 2 |
| MP 195-MP 201 | Landform, vegetation | U.S. Highway 6, Ely Recreation Site | Long Term | 22/17/- | 2 |
| MP 232-MP 237 | Landform, vegetation | U.S. Highway 6, Currant Creek Campground | Long Term | 22/18/- | PR |
| MP 268-MP 274 | Vegetation | U.S. Highway 6 | Long Term | -/22/- | 2 |
| MP 278-MP 280 | Vegetation | U.S. Highway 6 | Long Term | -/18/- | 2 |
| MP 310-MP 314 | Vegetation | U.S. Highway 6 | Long Term | -/22/- | 2 |
| MP 329-MP 331 | Vegetation | U.S. Highway 6 | Long Term | -/18/- | R,PR |
| MP 332-MP 338 | Vegetation | U.S. Highway 6, Roadside Reststop | Long Term | -/18/- | R,PR |
| MP 338-MP 341 | Vegetation | U.S. Highway 6 | Long Term | -/18/- | R,MM |
| MP 356-MP 358 | Landform, vegetation | Tonopah | Long Term | 22/17/- | 2 |
| MP 546-MP 554 | Vegetation | U.S. Highway 395 | Long Term | -/18/- | 2,3 |
| MP 569-MP 576 | Vegetation | U.S. Highway 395 | Long Term | -/20/- | 2 |
| MP 600-MP 606 | Vegetation | U.S. Highway 395 | Long Term | -/17/- | 2,3 |
| **ANCILLARY FACILITIES** | | | | | |
| Sage Compressor Station and Maintenance base and the Heber City and Nephi maintenance bases are the same as the proposed action. | | | | | |
| Tonopah Maintenance Base: | | | | | |
| Tonopah, Nevada Vicinity | Vegetation, structure | Tonopah, U.S. Highway 6 | Long Term | -/16/27 | 3 |
| Inyokern Maintenance Base: | | | | | |
| Inyokern, California Vicinity | Vegetation, structure | Inyokern, U.S. Highway 395 | Long Term | -/20/27 | 3 |

[1]The composition of the characteristic landscape would be modified by changing the landform, water form, or vegetation or by adding a structure to the landscape.

[2]A critical viewpoint is the point where the proposed change would be most apparent.

[3]Duration of impact can be described as:
Temporary--During construction through first or second growing season.
Short term--For 2 to 5 years following construction.
Long term--5 years to project life to (20 years) or longer.

[4]Contrast Rating Feature Score is a value which the contrast of a specific area could not exceed without creating a significant adverse visual impact. VRM Class 2 and VQO R both have a Feature Score of 12. VRM Class 3 and VQO PR both have a Feature Score of 16. VRM Class 4 and VQO M,MM both have a Feature Score of 20. See appendix I for further explanation.

[5]See table 3-10 for definitions of terms.

[6]Mileposts indicate where Alternative C would leave and rejoin the proposed action.

## Land Uses: Wilderness, Agriculture, and Conflicts with Land Use Plans, Controls, and Constraints

### WILDERNESS

The Central Nevada Alternative would enter the Rawhide Mountains WSA (NV- 060-059) in Nevada and the Notch Peak WSA (U-050-078) in Utah, causing significant impacts (BLM 1980a, 1980b). The construction and operation of the alternative would permanently impair the wilderness values by clearing vegetation, disturbing soil and wildlife, and degrading noise and air quality. This would violate section 603(c) of FLPMA. The natural pristine characteristics and solitude that were the reason for designating these two units as WSA's would also be impaired. Wilderness suitability would be permanently impaired.

### AGRICULTURE

The Central Nevada Alternative would affect 1,295 acres of cropland. Assuming implementation of the revegetation and restoration guidelines proposed by the applicant and listed in appendix C, successful restoration of all croplands would be expected within 1 to 2 years. An exception would be the need to schedule construction to avoid disturbing irrigation and subsurface drainage systems, especially in the Delta, Utah, area.

Impacts to the Robinson Canyon Watershed Project (P.L. 566) near Ely, Nevada, would be short term and insignificant due to the anticipated successful restoration using the erosion control structures, revegetation, and critical erosion control treatment measures outlined in appendix C.

The Sage Compressor Station would be located on native grazing land. Land use for the remaining surface sites is not known because specific locations are not known at this time.

### CONFLICTS WITH LAND USE PLANS, POLICIES, AND CONTROLS

The Central Nevada Alternative would conflict with the draft Benton-Owens Valley MFP because it would not follow the designated transmission corridor. However, the MFP did not consider pipelines for inclusion in the corridor. Because the plan is a draft and the pipeline would be buried, the pipeline would not violate the intent of the MFP nor interfere with other designated land uses (Morrison 1980).

This alternative would not follow the utility corridors designated by the BLM California Desert Plan. However, since it would follow a contingency utility corridor for which the plan contains an amendment procedure, the placement of this alternative would not violate the intent of the California Desert Plan. As would the proposed action, this alternative would also conflict with the Utility Corridor Rule as discussed in the proposed Forest Management Plan for the Uinta National Forest. See the discussion for the proposed action in this chapter for the implications of the conflicts.

## Socioeconomics

Constructing this alternative could be accomplished using six construction spreads between Nephi, Utah, and Adelanto, California. The first three spreads would work through rough terrain; the final three spreads would be in rolling country. The Sage Compressor Station and pipeline spreads 1 and 2 of the RMPP would still be required for this alternative. Total employment during the peak construction period would be 2,722 workers; if the five maintenance bases listed in table 2-4 were also constructed, an additional 100 workers would be employed during the peak period. Table 2-3 lists the number of employees required for this alternative. Each peak pipeline spread would be divided into two work crews--79 percent working on the right-of-way, 21 percent working in double-jointing yards.

Because this alternative would be located in remote parts of Utah, Nevada, and eastern California, regional population and employment increases would be relatively high for a pipeline project, averaging 1.5 and 3.4 percent, respectively, for all spreads. Pipeline spreads 1, 4, and 5 would generate a 10- to 12-percent increase in retail sales during the construction period. (See table 3-29 for the locations of these spreads.) Only one--pipeline spread 6 in southern California--would generate less than a 6-percent increase. Demands for available housing would be very high for spreads 1 through 5. Of these, the lowest demand on hotel/motel rooms would occur from spread 5, which would require 24 percent of the existing rooms; the highest would occur with spread 4, which would require more rooms than exist in the region. A large percentage of the available campsites would also be required, ranging from 20 percent for spread 1 to 75 percent for spread 4. Spread 6 would require only 7 percent of the existing hotel/motel rooms and campsites.

At the same time that pipeline workers for spreads 2 through 5 would be looking for housing, other development projects in the area will have filled all of the vacancies. Under construction will be the White Pine coal-fired power plant near Ely, Nevada, and two mines near Tonopah, Nevada. Ely and Tonopah are the only towns where housing would exist for spreads 2 through 5. In addition to these projects, the potential construction of the MX missile system could have more dramatic impact on many towns, including Delta, Ely, and Tonopah. This possibility is described more fully in the USAF's draft EIS evaluating the project (USAF 1980).

Because of these other development projects, the applicant would need to construct work camps to house the pipeline work force. Potential locations for these work camps are shown in table 2-2. Each spread would need a work camp that supplied housing, food, water, and sewerage. The camps could include barracks, mess halls, and showers, or they could be mobile home parks where workers had more private accommodations. An ambulance at each work camp would be advisable. Local police, fire, and medical facilities would still be required from local communities; these local services

would probably be strained because of the other developments in the vicinity.

The Central Nevada Alternative would probably be operated and maintained by the same size work force as the RMPP, except that two additional maintenance bases might be necessary, requiring an additional 14 employees. The small operating work force of 82 people would not present significant socioeconomic ramifications, except that the 14 workers for the Ely and Tonopah maintenance bases might not be able to find housing. If they could not, permanent housing, water, and sewerage would be needed at the maintenance bases to accommodate the workers.

## Topography

The Central Nevada Alternative would require about 5 miles of sidehill construction: 1 mile in Kings Canyon (MP 109 to MP 110), 2 miles in Murry Canyon (MP 196 to MP 198), and 2 miles at the southern end of Rose Valley (MP 565 to MP 567).

## Air Quality

During construction of the Central Nevada Alternative pipeline, compressor stations, and ancillary facilities, pollutant emissions would depend upon the type and amount of equipment used and the extent of its use. Impact would depend on relative locations of construction. Generally, the emissions resulting from pipeline construction include HC's, $NO_x$, CO, $SO_x$, TSP, and water vapor. Dispersion of these pollutants would depend upon local atmospheric stability and meterological conditions.

Construction would cause temporary and minimal deterioration of the ambient air quality. It would also cause localized, short term dust conditions which could pose a temporary nuisance in dry and windy weather. The most likely places for this would be Nye County, Nevada, and San Bernardino County, California. Additional construction-related impact is discussed in the air quality analysis for the RMPP.

The stack parameters for the compressor at the Sage Compressor Station were used for modeling emissions from future compressor stations along this alternative. Estimated air emissions during operation of the Sage Compessor Station, the major source of air emissions directly related to the operation of this alternative, are listed in table 4-19. The compression facilities necessary to expand this system to 800,000 Mcfd and the emissions they would produce are also included in the table. All of the compressors would use natural gas as their fuel.

TABLE 4-19

POTENTIAL ANNUAL AIR EMISSIONS FROM THE CENTRAL NEVADA ALTERNATIVE

| Volume | County, State | [a]Compressor Station | Required Horsepower | [b]Potential Increase in Emissions (Tons/Year) | | | | Annual Operation (Day/Year) | [c]PSD Review | Fuel Required (Million cfd) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $NO_x$ | CO | HC | $SO_2$ | | | |
| 413,300 Mcfd | Lincoln, Wyoming..... | Sage | 25,650..... | 326 | 124 | 22 | 0.44 | 365 | Yes ..... | 3.52 |
| | Lincoln, Wyoming..... | Sage | 52,400..... | 666 | 252 | 46 | 0.91 | 365 | Yes ..... | 7.02 |
| 800,000 Mcfd | Millard, Utah ..... | Station 1 | 22,850..... | 290 | 110 | 20 | 0.40 | 365 | Yes ..... | 3.21 |
| | White Pine, Nevada ..... | Station 2 | 25,650..... | 326 | 123 | 22 | 0.44 | 365 | Yes ..... | 3.60 |
| | Esmeralda, Nevada ..... | Station 3 | 19,300..... | 245 | 93 | 17 | 0.33 | 364 | No..... | 2.71 |

[a]Gas-turbine units are assumed to be installed at each compressor station.

[b]Emissions calculated by the potential to emit, using EPA's compilation of emission factors. All emissions are in tons/year. Particulate matter emissions would be negligible.

[c]EPA 1980b.

The ground-level impact from operation of the Sage Compressor Station and booster stations would be quite similar to the ground-level impact expected from operation of the RMPP at 413,000- or 800,000-Mcfd levels. The ground- level concentration of $NO_x$ would not exceed an annual arithmetic mean of 2.63 ug per cubic meter at 456 meters from the source. Assuming a background concentration of 20 ug per cubic meter, a ground-level $NO_x$ concentration of 22.63 ug per cubic meter would be expected. The expected ground-level concentration of CO would produce a 1-hour concentration of 19.84 ug per cubic meter and an 8-hour average of 13.88 ug per cubic meter. At a throughput of 800,000 Mcfd, the $NO_x$ ground- level emissions at the Sage Compressor Station would not exceed an annual arithmetic mean of 5.38 ug per cubic meter 456 meters from the source. The expected ground-level emissions of CO would produce a 1-hour concentration of 40.53 ug per cubic meter and an 8-hour concentration of 28.37 ug per cubic meter.

The specific ground-level impact for each of the required compressor stations would depend upon the horsepower required for each station. The compressor station in Millard County, Utah, would require 22,810 hp. The potential $NO_x$ ground-level concentration would produce an annual arithmetic mean of about 2.34 ug per cubic meter 456 meters from the source, a total annual ground-level concentration of 22.34 ug per cubic meter. The expected ground-level emissions of CO would produce a 1-hour concentration of 17.67 ug per cubic meter and an 8-hour concentration of 12.37 ug per cubic meter.

The compressor station in White Pine County, Nevada, would require 25,650 hp. The potential $NO_x$ ground-level concentration from its operation would produce an annual arithmetic mean of about 2.63 ug per cubic meter 456 meters from the source; the potential total ground-level concentration would be about 22.63 ug per cubic meter. The expected ground- level emissions of CO would produce a 1-hour concentration of 19.84 ug per cubic meter and an 8-hour concentration of 13.88 ug per cubic meter.

The compressor station in Esmeralda County, Nevada, would require 19,300 hp. The potential $NO_x$ ground-level concentration produced by booster station operations would result in an annual arithmetic mean of 1.98 ug per cubic meter 456 meters from the source. The potential total ground-level concentration would be about 21.98 ug per cubic meter. The expected ground-level emissions of CO would produce a 1-hour concentration of 14.93 ug per cubic meter and an 8-hour concentration of 10.45 ug per cubic meter.

All levels of emissions from operation of the compressor stations would be well below the NAAQS.

For a throughput of 413,00 Mcfd, only the Sage Compressor Station would require a PSD review by the State of Wyoming. However, at 800,000 Mcfd, Compressor Station 1 (Millard County, Utah) and Compressor Station 2 (White Pine County, Nevada) would require a PSD permit before construction and operation. If the Sage Compressor Station could not increase plant operating capacity under its original permit, an additional PSD review might be necessary under the *de minimis* PSD State Implementation Plans Air Regulations of August 7, 1980.

# ALTERNATIVE D--SEVIER-ESCALANTE DESERT ALTERNATIVE

## Vegetation

The Sevier-Escalante Alternative would affect 6,495 acres of native vegetation (see table 3-1). Of this acreage, the understory would be capable of returning to preconstruction densities within 5 years after completion of construction. The overstory vegetation would require longer than 5 years to reestablish.

The acres (by vegetation type) which would be temporarily or permanently removed by the Sevier-Escalante Desert Alternative are shown in table 3-1. A loss of 606 acres of forest, pinyon-juniper, and mountain brush vegetation type would occur for the life of the project (20 years). Approximately 14 acres of riparian vegetation would be temporarily lost. Joshua trees and cacti scattered within creosote bush and saltbush-greasewood vegetation types could be affected over a total of 3,464 acres.

## Wildlife

### MAMMALS AND BIRDS

The Sevier-Escalante Desert Alternative would cross about 158 miles (1,915 acres) of big game winter range. The discussion of the proposed action details the type of impacts that would occur.

This alternative would cross an estimated 41 miles (497 acres) of sage grouse habitat, 51 miles (618 acres) of waterfowl habitat, 49 miles (594 acres) of

raptor habitat and 23 miles (279 acres) of golden eagle nesting areas. The proposed action discussion details the type of impacts which could be expected in all these bird habitats.

### FEDERAL AND STATE LISTED SPECIES

The black-footed ferret and bald eagle, both federally listed species, would be affected in the same areas and in the same manner as discussed for the proposed action.

The state listed desert tortoise would be affected by this alternative in the same areas and ways as noted for the proposed action.

## Soils

The Sevier-Escalante Desert Alternative would disturb 7,539 acres of soils. Of this acreage, the following amounts would be most strongly affected: 1,309 acres of Soil Group 1, 230 acres of Soil Group 2, 727 acres of Soil Group 3, 61 acres of Soil Group 4, 570 acres of Soil Group 5, 206 acres of Soil Group 6, 36 acres of Soil Group 7, 170 acres of Soil Group 8, and 3,394 acres of Soil Group 9. Refer to the discussion of the proposed action and table 3-9 for additional soil information.

## Visual Resources

No significant adverse visual resource impacts would occur along the Sevier-Escalante Desert Alternative between alternative MP 96 and alternative MP 394 (the portion that would deviate from the proposed action). However, significant adverse impacts would occur along those portions of the proposed action which preceed and follow the alternative routing. Refer to the proposed action discussion for a further explanation and to table 4-2 for a summary of VRM Class and VQO impacts along the proposed action.

## Land Uses: Agriculture and Conflicts with Land Use Plans, Policies, and Controls

### AGRICULTURE

The Sevier-Escalante Desert Alternative would temporarily disturb 1,016 acres of cropland. Assuming the Erosion Control, Revegetation, and Restoration Guidelines outlined in appendix C were implemented, successful restoration of all croplands would be expected within 1 to 2 years. The Sage Compressor Station would be located on native grazing land. Land use for the remaining surface facility sites is not known because specific locations for the sites have not yet been identified.

### CONFLICTS WITH LAND USE PLANS, POLICIES, AND CONTROLS

The Sevier-Escalante Desert Alternative, like the proposed action, would conflict with the Utility Corridor Rule of the proposed Forest Land Management Plan for the Uinta National Forest. It also would not follow the over 3,000-foot wide corridor administered by BLM through the 70,000 acres transferred from BLM administration to the Moapa Indian Reservation. See the discussion for the proposed action for the implications of these conflicts.

At this time, it is unknown whether or how the Sevier-Escalante Desert Alternative would conflict with the forthcoming (June, 1981) Draft Management Master Plan for the proposed Clark County Wetlands park in southern Nevada.

## Socioeconomics

This alternative would parallel the RMPP route between MP 196 and MP 364. The employment and construction schedules would be the same as those of the proposed route. Table 2-3 lists the number of employees required to construct this alternative. The region of impact would be similar to RMPP spreads 3 and 4. Regional socioeconomic impact would be insignificant. Local impact to towns nearer this alternative route would also be minor, the main difference being that accommodations in these towns might be more desirable because of their proximity to the construction site. Table 4-20 lists towns with accommodations that are within 20 road miles of the Sevier-Escalante Desert Alternative.

Operation and maintenance of this alternative would not differ from that of the proposed route. However, county property tax revenues would be different, as shown in table 4-4.

TABLE 4-20.

TOWNS WITH HOUSING ALONG THE SEVIER-ESCALANTE DESERT ALTERNATIVE

| Construction | Communities With Accommodations Within 20 Miles of the Pipeline | Communities With Accommodations 21 to 40 Miles From the Pipeline |
|---|---|---|
| Pipeline Spread 3 | Nephi<br>Delta<br>Milford | Payson<br>Provo<br>Springville<br>Beaver<br>Fillmore |
| Pipeline Spread 4 | Milford<br>St. George<br>Washington | Beaver<br>Parowan<br>Cedar City |

# ALTERNATIVE E--WEST SALT LAKE ALTERNATIVE

## Vegetation

The West Salt Lake Alternative would affect 8,071 acres of vegetation. Of this acreage, the understory vegetation would be capable of returning to preconstruction densities within 5 years after construction; the overstory vegetation would require longer to reestablish. Pickleweed and other saline plants would reinvade within the following 1 to 2 years, and 1,030 acres of barren land would remain basically barren.

The acres of each vegetation type which would be temporarily and permanently removed by the West Salt Lake Alternative are shown in table 3-1. A loss of 372 acres of forest, pinyon-juniper, and mountain brush vegetation types would occur for the life of the project (20 years). Joshua trees and cacti (scattered within 3,380 acres of creosote bush and saltbush-greasewood vegetation types) could be affected. Approximately 10 acres of riparian habitat would be temporarily lost.

## Wildlife

### MAMMALS AND BIRDS

The West Salt Lake Alternative would cross 120 miles (1,454) acres of big game winter range. The type of impacts to big game animals are similar to those discussed in the analysis of the proposed action.

The proposed action route below where this alternative would rejoin the proposed action route would pass near eight desert bighorn sheep areas and would intersect approximately five sheep migration routes (table 3-4).

Harrassment impacts to desert bighorn sheep around water sources would result from construction workers camping or parking near these areas. During the mid-May through mid-September time period, water becomes vital to the survival of these animals. Any activity within 2 miles of a water source may cause these animals to abandon the water source (Leslie and Douglas 1980, Janke 1981) and move to other areas that may be less favored but are removed from human activity. Impacts caused by deprivation of water include dehydration and possible loss of young animals, the possible resorption of the embryo, and a resulting reduction in production.

An estimated 25 miles (303 acres) of desert bighorn sheep range would be crossed by this route. If the route passes within 2 miles of a water source utilized by bighorns during the critical May 15 to September 15 period (table 3-2), serious impacts as noted previously could occur.

Sage grouse habitat would be crossed by this alternative for an estimated distance of 46 miles (558 acres) along the route (table 2-3). Sage grouse areas should be avoided during the critical time of the year from March 1 through June 30 (table 3-7). The types of impacts expected and their results are the same as those detailed in the proposed action section.

This alternative would cross or disturb an estimated 29 miles (351 acres) of raptor habitat (table 2-4).

The critical period of the year that raptor areas should be avoided is March 1 through June 30 (table 3-7). Impacts to these species will not occur if active nests are not disturbed during this period or if construction activities take place more than 1 mile from active nests. The types of impacts expected if disturbances do occur are noted in the proposed action section.

This alternative would cross about 21 miles (254 acres) of waterfowl habitat. The types of impacts to these species are identical to those discussed in the proposed action analysis.

### FEDERAL AND STATE LISTED SPECIES

The federally listed black-footed ferret and bald eagle would be affected by construction of this alternative in the same areas and in the same manner as the proposed action. The state listed desert tortoise would also be affected in the same areas and in the same manner.

## Soils

The West Salt Lake Alternative would disturb 9,053 acres of soils. The following amounts would be most strongly affected: 376 acres of Soil Group 1 (including a narrow steep canyon in the Caribou National Forest, MP 11 to MP 23); 279 acres of Soil Group 2; 885 acres of Soil Group 3; 48 acres of Soil Group 4; 570 acres of Soil Group 5; 424 acres of Soil Group 6; 897 acres of Soil Group 7 (including a large playa area from MP 157 to MP 225); 170 acres of Soil Group 8; and 4,739 acres of Soil Group 9. Refer to the discussion of the proposed action and table 3-9 for additional soil information.

## Visual Resources

Similar to the proposed action, the significant adverse visual resource impacts from the West Salt Lake Alternative would include contrasts from modifications of landform, vegetation, and the addition of structures noted in table 4-21. Refer to the proposed action discussion for a further explanation and to table 4-3 for a summary of VRM Class and VQO impacts.

TABLE 4-21

SIGNIFICANT ADVERSE VISUAL RESOURCE IMPACTS OF THE WEST SALT LAKE ALTERNATIVE

| MP | Affected Landscape Feature[1] | Critical Viewpoint[2] | Duration of Impact[3] | Contrast Rating Feature Score[4] | VRM Class and/ or VQO[5] |
|---|---|---|---|---|---|
| **PIPELINE** | | | | | |
| Beginning at Montpelier, Idaho | | | | | |
| MP 11-MP 18 | Vegetation | State Highway 36 | Long Term | -/29/- | R |
| MP 18-MP 23 | Landform, vegetation | State Highway 36 | Long Term | 22/27/- | R |
| (Refer to proposed action discussion between MP 254 and MP 610)[6] | | | | | |
| **ANCILLARY FACILITIES** | | | | | |
| Montpelier Compressor Station and Maintenance Base: | | | | | |
| MP 0 | Vegetation, structure | Montpelier, U.S. Highway 30N and 89 | Long Term | -/15/29 | 4 |

[1]The composition of the characteristic landscape would be modified by changing the landform, water form, or vegetation or by adding a structure to the landscape.

[2]A critical viewpoint is the point where the proposed change would be most apparent.

[3]Duration of impact can be described as:
Temporary--During construction through first or second growing season.
Short term--For 2 to 5 years following construction.
Long term--5 years to project life to (20 years) or longer.

[4]Contrast Rating Feature Score is a value which the contrast of a specific area could not exceed without creating a significant adverse visual impact. VRM Class 2 and VQO R both have a Feature Score of 12. VRM Class 3 and VQO PR both have a Feature Score of 16. VRM Class 4 and VQO M,MM both have a Feature Score of 20. See appendix I for further explanation.

[5]See table 3-10 for definitions of terms.

[6]Mileposts indicate where Alternative E would leave and rejoin the proposed action.

## Land Uses: Recreation Resources, Agriculture, and Conflicts with Land Use Plans, Policies, and Controls

### RECREATION RESOURCES

The construction of the pipeline along the alignment of State Highway 36 would create noise, odor, and dust from construction equipment, visual impairment, and traffic delays. These construction impacts would be short term (6 to 8 weeks) and significant, since the quality of the recreation experiences enjoyed on lands buffering the highway would be diminished. Public sensitivity toward these impacts would be high, especially if the alternative crossed the Emigration Pass Campground or degraded the hunting and fishing experiences within the canyon.

### AGRICULTURE

The West Salt Lake Alternative would temporarily disturb 1,053 acres of cropland. Assuming the Erosion Control, Revegetation, and Restoration Guidelines outlined in appendix C were implemented, successful restoration of all croplands would occur within 1 to 2 years.

### CONFLICTS WITH LAND USE PLANS, POLICIES, AND CONTROLS

The West Salt Lake Alternative, like the proposed action, would not follow the 3,000-foot wide utility corridor administered by BLM through the 70,000 acres transferred from BLM administration to the Moapa Indian Reservation. See the discussion of the proposed action in this chapter for the implications of this conflict.

The West Salt Lake Alternative, like the proposed action, would pass through the area covered by the proposed Clark County Wetlands Park in southern Nevada. The county has plans to issue a Draft Management Master Plan in June 1981. The final RMPP EIS will include analysis to determine whether the RMPP would conflict with the draft management plan.

## Socioeconomics

Construction of this alterative would require a compressor station construction crew and four pipeline spreads. If constructed, the alternative would replace the Sage Compressor Station and pipeline spreads 1, 2, and half of 3 of the RMPP. The labor requirements and construction schedule for the compressor station and each pipeline spread would be the same as those of the RMPP. Therefore, a total of 1,380 workers would be employed during the peak construction period. However, if the three maintenance bases listed in table 2-4 were also constructed, an additional 60 workers would be employed during the peak period. Table 2-3 lists the number of employees required to implement this alternative. Each peak pipeline spread would be divided into two work crews--79 percent working on the right-of-way, 21 percent in double- jointing yards.

A relatively large increase in county population and employment would occur during peak construction along the fourth spread in Millard County, Utah.

The population would increase 3.46 percent, and the number of employed people would increase 8.43 percent. Retail sales would increase by 13.31 percent over the entire 6-month period. Workers would need 54 and 77 percent, respectively, of the existing hotel/motel rooms and campsites. Regional population increases from the first three spreads would be less than 1 percent; increases in employment and retail sales would also be small.

However, these three spreads would need between 20 and 60 percent of the existing accommodations. Like spread 4, they would fill most of the vacancies in the region, inconveniencing other travelers and campers during the peak months of construction. The towns most likely to be affected by the housing demand are listed in table 4-22.

Because the compressor station for the West Salt Lake Alternative would be constructed near Montpelier, Idaho, and there are no major municipalities nearby, most of the workers would probably want to live in Montpelier. This would increase population 5.8 percent and the number of employed 3.2 percent. Retail sales would increase 7.6 percent during the 6-month construction period. Thirty-five percent of the hotel/motel rooms and 30 percent of the campsites would be required by construction workers. Pipeline workers from spread 1 would also want to live in Montpelier, further increasing the socioeconomic impact. They would probably fill all the vacancies in town, inconveniencing other travelers and campers hoping to stay overnight.

Operation and maintenance of this alternative would not differ from that of the proposed route. Maintenance bases probably would be located at Montpelier, Idaho, and at Lucin and Dugway, Utah; seven workers would be employed at each. Tax

payments would accrue to additional counties in both Idaho and Utah, as shown in table 4-4.

TABLE 4-22

TOWNS WITH HOUSING ALONG THE WEST SALT LAKE ALTERNATIVE

| Construction | Communities With Accommodations Within 20 Miles of the Pipeline | Communities With Accommodations 21 to 40 Miles From the Pipeline |
|---|---|---|
| Montpelier Compressor Station | Montpelier | |
| Pipeline Spread 1 | Kemmerer<br>Randolph<br>Montpelier<br>Logan<br>Tremonton | Garden City<br>Brigham City<br>Willard |
| Pipeline Spread 2 | | Tremonton<br>Wendover<br>[a]Grantsville<br>[b]Tooele |
| Pipeline Spread 3 | Delta | [a]Wendover<br>[b]Grantsville<br>[c]Tooele<br>[d]Eureka |
| Pipeline Spread 4 | Delta<br>Fillmore | Nephi |

[a]Grantsville is approximately 60 miles from the alternative.
[b]Tooele is approximately 70 miles from the alternative.
[c]Tooele is approximately 55 miles from the alternative.
[d]Eureka is approximately 45 miles from the alternative.

## Topography

The West Salt Lake Alternative would require about 4 miles of sidehill construction. About 3 miles in the Williams Canyon area (MP 13 to MP 14 and MP 20 to MP 22) and 1 mile in the Gunsight Peak area (MP 66) would be affected.

## Noise Quality

Pipeline construction along this alternative would cause the same types of impact as those discussed for the RMPP.

Operation of the Montpelier Compressor Station would be the major source of noise emissions during the pipeline's operation. The alternative would install 23,350 hp. of compression. The resulting noise impact of the maximum horsepower upon the nearest residence would be an $L_{eq}$ of 44.8 dB(A) and an $L_{dn}$ 51.2 dB(A). These values represent an increase of 1.8 dB(A) over ambient levels. A 1.8-dB(A) increase is not noticeable.

Compressor station design would include noise suppression equipment to meet the noise limits in effect at the time the compressors were purchased.

## Air Quality

### CONSTRUCTION-RELATED IMPACT

Pollutant emissions during construction of the West Salt Lake Alternative compressor stations and ancillary facilities would depend upon the type and amount of equipment used and the extent of its use. Generally, the emissions resulting from pipeline construction include HC's, $NO_x$, CO, $SO_x$, TSP, and water vapor. Ground-level concentrations of pollutants would depend upon relative locations of construction. Dispersion of these pollutants would depend upon local atmospheric stability and meterological conditions.

Construction would cause temporary and minimal deterioration of the local ambient air quality. It would cause localized, short term dust conditions which could pose a temporary nuisance during dry and windy weather. The most likely places for this to occur would be Bear Lake County, Idaho, Clark County, Nevada, and San Bernardino County, California.

### OPERATION IMPACT

Emissions from the Montpelier Compressor Station, the major source of air emissions directly related to the operation of the West Salt Lake Alternative, are listed in table 4-23. The compression facilities necessary to expand the system to transport 800,000 Mcfd are also included in the table. All of the compressors would use natural gas as their fuel. The Sage Compressor Station stack parameters were used to model the air quality impact of the Montpelier compressor station and compressor stations along the West Salt Lake route.

The ground-level impact resulting from operation of the Montpelier Compressor Station would be similar to the ground-level impact expected from operation of the proposed Sage Compressor Station at design flow rates of 413,000 and 800,000 Mcfd. The initial ground-level concentration of $NO_x$ for the 413,000-Mcfd volume would produce an annual arithmetic mean of 2.40 ug per cubic meter 456 meters from the source. Assuming a background

$NO_x$ concentration of 20 ug per cubic meter, the resulting ground-level concentration would be 22.4 ug per cubic meter. The expected ground-level concentration of CO would produce a 1-hour concentration of 18.06 ug per cubic meter and an 8-hour average of 12.64 ug per cubic meter. At 800,000 Mcfd, the $NO_x$ ground-level impact at the Montpelier Compressor Station would not exceed an annual arithmetic mean of 5.38 ug per cubic meter. The CO concentrations would be a 1-hour concentration of 40.53 ug per cubic meter and an 8-hour average concentration of 28.37 ug per cubic meter, both 456 meters from the source.

The ground-level impact for each compressor station would depend upon the horsepower required for each station. The first compressor station, located in Box Elder County, Utah, would require the installation of 18,800 hp. Its potential ground-level $NO_x$ emissions would produce an annual arithmetic mean of 1.93 ug per cubic meter 456 meters from the source, resulting in a total ground-level concentration of 21.93 ug per cubic meter. Nevertheless, the maximum increase in the annual arithmetic mean for $NO_2$ would be about 2.0 ug per cubic meter. The expected ground- level emissions of CO would produce a 1-hour concentration of 14.54 ug per cubic meter and an 8-hour concentration of 10.18 ug per cubic meter.

The second compressor station in Millard County, Utah, would require the installation of 19,200 hp. Its potential ground-level $NO_x$ concentration would produce an annual arithmetic mean of 1.97 ug per cubic meter 456 meters from the source. The potential ground-level concentration, including background levels, would be about 21.97 ug per cubic meter. The expected ground-level emissions of CO would produce a 1-hour concentration 14.85 ug per cubic meter and an 8-hour concentration of 10.39 ug per cubic meter.

The third compressor station in Washington County, Utah, would require the installation of 9,050 hp. Potential $NO_x$ ground-level impact from its operation would produce an annual arithmetic mean of 0.93 ug per cubic meter. The total potential $NO_x$ ground-level impact would be about 20.93 ug per cubic meter. The expected ground-level concentration of CO would produce a 1-hour concentration of 7.03 ug per cubic meter and an 8-hour concentration of 4.9 ug per cubic meter. Nevertheless, all of these values for all the compressor stations for both pollutants are well below the levels set under NAAQS to protect public health and welfare.

No impact upon any Class I area would be expected from construction and operation of the West Salt Lake Alternative. The operation of the Montpelier Compressor Station would produce ground-level $NO_x$ concentrations of only 2.40 ug and 5.38 ug per cubic meter for the 413,000- and 800,000-Mcfd cases, respectively. Therefore, the nearest Class I area, 140 miles north of the Montpelier Compressor Station, would not experience any ground-level impact. This would also be the case for each of the other compressor stations, because the potential ground-level impact from each station would be less than 2 ug per cubic meter 456 meters from the source. The Class I area nearest any of the booster stations would be Zion National Park, 30 miles due east of the compressor station in Washington County, Utah.

TABLE 4-23

POTENTIAL ANNUAL AIR EMISSIONS FROM THE WEST SALT LAKE ALTERNATIVE

| Volume | [a]Compressor Station | Required Horsepower | County, State | [b]Potential Emissions (tons/year) | | | | Annual Operation (Days/Year) | [d]PSD Review Required | Fuel Requirement (Mcfd) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $NO_x$ | CO | HC | [c]$SO_2$ | | | |
| 413,000 Mcfd | Montpelier | 23,350 | Bear Lake, Idaho | 297 | 112 | 20 | 0.40 | 365 | Yes | 3.20 |
| 800,000 Mcfd | Montpelier | 52,400 | Bear Lake, Idaho | 666 | 252 | 46 | 0.90 | 365 | Yes | 7.02 |
| | Station 1 | 18,800 | Box Elder, Utah | 238 | 91 | 16 | 0.32 | 365 | No | 2.63 |
| | Station 2 | 19,200 | Millard, Utah | 243 | 92 | 17 | 0.33 | 365 | No | 2.19 |
| | Station 3 | 9,050 | Washington, Utah,. | 115 | 44 | 8 | 0.15 | 365 | No | 1.27 |

[a]Gas-turbine units are assumed at each compressor station.

[b]Particulate matter emissions are negligible for natural gas fuel gas turbines.

[c]Emissions calculated by the potential to emit, according to EPA's compilation of emission factors.

[d]EPA 1980b.

# ALTERNATIVE F--PROVO CANYON ALTERNATIVE

## Vegetation

The Provo Canyon Alternative would affect 6,300 acres of vegetation. The understory would be capable of returning to preconstruction densities within 5 years after completion of construction; the overstory would require longer.

A loss of 411 acres of forest, pinyon-juniper, and mountain brush types would occur for the life of the project (20 years). Joshua trees and cacti (scattered within 3,028 acres of creosote bush and saltbush-greasewood vegetation types) could be affected. Approximately 12 acres of riparian vegetation would be temporarily lost.

## Wildlife

### MAMMALS AND BIRDS

An estimated 186 miles (2,254 acres) of big game winter range would be crossed by the Provo Canyon Alternative and other parts of the proposed action route as noted in table 3-3). The types of impacts would be identical to those discussed for the proposed action.

The proposed action below where this alternative would rejoin the proposed action would pass near eight desert bighorn sheep areas and would intersect approximately five sheep migration routes (as noted in table 3-4). A total of 25 miles (303 acres) of sheep range could be affected. Harassment of desert bighorn sheep around water sources would result from construction workers camping or parking near these areas. From mid-May through mid-September, water is vital to the survival of these animals. Any activity within 2 miles of a water source (Janke 1980) may cause these animals to abandon the water source (Leslie and Douglas 1980) and move to other areas that may be less favored but are removed from human activity. Impacts caused by deprivation of water include dehydration and possible loss of young animals as well as resorption of embryos, both reducing the species production.

This alternative would disturb or cross an estimated 25 miles (303 acres) of sage grouse habitat (table 3-5). The critical times of the year that should be avoided in sage grouse areas is March 1 through June 30 (table 3- 8). The types of impacts expected and their result are the same as those discussed for the proposed action.

This alternative would cross about 63 miles (764 acres) of raptorial bird nesting and hunting habitat. The types of impacts would be the same as those discussed for the proposed action. Waterfowl nesting areas would be crossed by the proposed action portion of the route for an estimated 24 miles (291 acres) along the route (table 3-6). The most critical time of the year for this type of nesting habitat to be avoided is the March 15 to June 15 period as this is when the peak of breeding and nesting occurs (table 3-8).

### FEDERAL AND STATE LISTED SPECIES

Impacts to the black-footed ferret might occur, since this species could be found north of where the Provo Canyon Alternative left the proposed action. Impacts to the bald eagle would be identical to those noted for the proposed action. Impacts to the desert tortoise in Utah, Nevada, and California, would be the same as those noted for the proposed action.

## Soils

The Provo Canyon Alternative would disturb 7,502 acres of soils. The following amounts would be most strongly affected: 739 acres of Soil Group 1, 291 acres of Soil Group 2, 424 acres of Soil Group 3, 61 acres of Soil Group 4, 570 acres of Soil Group 5, 194 acres of Soil Group 6, 48 acres of Soil Group 7, 206 acres of Soil Group 8, and 2,811 acres of Soil Group 9. Refer to the discussion of the proposed action and table 3-9 for additional soil information.

## Visual Resources

Similar to the proposed action, the significant adverse visual resource impacts from the Provo Canyon Alternative would include contrasts produced by modifications of landform, vegetation, and the addition of structures, as noted in table 4-24. Refer to the proposed action discussion for a further explanation and to table 4-2 for a summary of VRM Class and VQO impacts.

TABLE 4-24

SIGNIFICANT ADVERSE VISUAL RESOURCE IMPACTS OF THE PROVO CANYON ALTERNATIVE

| MP | Affected Landscape Feature[1] | Critical Viewpoint[2] | Duration of Impact[3] | Contrast Rating Feature Score[4] | VRM Class and/ or VQO[5] |
|---|---|---|---|---|---|
| **PIPELINE** | | | | | |
| (Refer to proposed action discussion between MP 0 and MP 108)[6] | | | | | |
| MP 7-MP 15 | Vegetation | Heber City area | Long Term | -/18/- | 2 |
| MP 15-MP 21 | Landform, vegetation | Heber City area, Wasatch Mountain State Park | Long Term | 24/15/- | 2 |
| MP 21-MP 30 | Landform, vegetation | Deer Creek Reservoir U.S. Highway 189 | Long Term | 16/12/- | R |
| MP 30-MP 32 | Landform, vegetation | Urbanized areas | Long Term | 15/17/- | R,2 |
| MP 32-MP 33 | Vegetation | Urbanized areas | Long Term | -/18/- | PR,3 |
| MP 33-MP 35 | Vegetation | Urbanized areas | Long Term | -/18/- | R,PR |
| MP 35-MP 38 | Vegetation | Urbanized areas | Long Term | -/18/- | PR,2 |
| MP 38-MP 53 | Landform, vegetation | Urbanized areas | Long Term | 13/18/- | 2 |
| (Refer to proposed action discussion between MP 214 and MP 610)[6] | | | | | |
| **ANCILLARY FACILITIES** | | | | | |
| Same as the proposed action. | | | | | |

[1]The composition of the characteristic landscape would be modified by changing the landform, water form, or vegetation or by adding a structure to the landscape.

[2]A critical viewpoint is the point where the proposed change would be most apparent.

[3]Duration of impact can be described as:
Temporary--During construction through first or second growing season.
Short term--For 2 to 5 years following construction.
Long term--5 years to project life to (20 years) or longer.

[4]Contrast Rating Feature Score is a value which the contrast of a specific area could not exceed without creating a significant adverse visual impact. VRM Class 2 and VQO R both have a Feature Score of 12. VRM Class 3 and VQO PR both have a Feature Score of 16. VRM Class 4 and VQO M,MM both have a Feature Score of 20. See appendix I for further explanation.

[5]See table 3-10 for definitions of terms.

[6]Mileposts indicate where Alternative F would leave and rejoin the proposed action.

## Land Uses: Agriculture and Conflicts with Land Use Plans, Policies, and Controls

### AGRICULTURE

The Provo Canyon Alternative would temporarily disturb 1,198 acres of cropland. Assuming the Erosion Control, Revegetation, and Restoration Guidelines outlined in appendix C were implemented, successful restoration of all croplands would occur within 1 to 2 years, with the exception of the small fruit orchards in the Provo area. Onsite adjustment during right-of-way alignment would minimize this impact. The Sage Compressor Station would be located on native grazing land. Specific location for the remaining surface facility sites are not yet known.

### CONFLICTS WITH LAND USE PLANS, POLICIES, AND CONTROLS

The Provo Canyon Alternative would not follow the 3,000-foot wide utility corridor administered by BLM through the 70,000 acres transferred from BLM administration to the Moapa Indian Reservation. See the discussion of the proposed action in this chapter for the implications of this conflict.

At this time, it is unknown whether and how the Provo Canyon Alternative, like the proposed action, would conflict with the forthcoming (June 1981) Draft Management Master Plan for the proposed Clark County Wetland Park in southern Nevada.

## Socioeconomics

This alternative would replace pipeline spread 2 of the RMPP; therefore, the employment and construction schedules could be the same as those of

the proposed route. Table 2-3 lists the number of workers required to implement this alternative.

The spread would be divided into two work crews--252 employees would work on the right-of-way, 67 in a double-jointing yard.

Although most of the alternative would traverse rural land, part of it would be close to the Provo-Orem metropolitan area. Table 4-25 lists the communities within 40 miles of the alternative. The Provo-Orem area, within commuting range of all points along the alternative, would probably be the area pipeline workers would choose to live. The population and employment increases in the alternative area would be minor--about 0.03 percent for population and 0.07 percent for employment. The increase in retail sales would be about 0.15 percent. The pipeline workers would only require 1.5 percent of the hotel/motel rooms and 4.8 percent of the campsites.

TABLE 4-25.

TOWNS WITH HOUSING ALONG THE PROVO CANYON ALTERNATIVE

| Communities With Accommodations Within 20 Miles of the Pipeline | Communities With Accommodations 21 to 40 Miles From the Pipeline |
|---|---|
| Heber City | Park City |
| Lindon | Salt Lake City |
| Orem | South Salt Lake |
| Pleasant Grove | Payson |
| Provo | Spanish Fork |
| Springville | |
| Eureka | |
| Nephi | |

A more significant short term impact of this alternative could occur to the tourist industry. If the pipeline were laid in the existing railroad right-of-way through Provo Canyon, the "Heber Creeper," a tourist train, might have to be closed during construction. In addition to the loss of the proprietor's revenues, secondary losses could occur to other retail establishments. If blasting were required during construction, all access through the canyon would be periodically restricted for safety.

A long term effect of this alternative would be crowding in Provo Canyon, which is already congested with other utilities. Another long term effect would be to the zoning ordinance of Springdell, Vivian Park, and Wildwood in Provo Canyon, which prohibits gas pipelines from crossing their boundaries. Special use permits would be required for the pipeline to cross these municipalities.

The operation and maintenance of this alternative would be the same as spread 2 of the RMPP. Tax payments would be different, as shown in table 4-4.

## Topography

The Provo Canyon Alternative would encounter approximately 6 miles of sidehill construction as well as crossing a steep slope as it exited the western end of the canyon. Using the roadbed or shoulder as the right-of-way might reduce the amount of sidehill construction necessary, but it might also require aboveground construction modes and/or tunnelling through rock.

# VARIATION 2--THISTLE CREEK VARIATION

## Vegetation

The Thistle Creek Variation would affect 266 acres of vegetation. The understory would be capable of returning to preconstruction densities within 5 years; the overstory would require longer to reestablish.

The acres of each vegetation type which would be temporarily or permanently removed by the Thistle Creek Variation are shown in table 3-1. A loss of 27 acres of pinyon-juniper vegetation types would occur for the life of the project (20 years). Approximately 2 acres of riparian vegetation would be temporarily lost.

## Wildlife

The Thistle Creek Variation would cross about 20 miles (242 acres) of big game winter range, while the portion of the proposed route it replaced would cross an estimated 16 miles (194 acres). The types of impacts would be the same as those discussed for the proposed action.

This variation would cross about 19 miles (230 acres) of raptor habitat while the portion of the proposed action it replaced would cross only 6 miles (73 acres) of raptor range. Anticipated impacts would be the same as those discussed for the proposed action.

## Soils

The Thistle Creek Variation would disturb 327 acres of soils. Most strongly affected would be 230 acres of Soil Group 1. This variation would traverse a mountain valley consisting of a narrow floodplain and smoother sloping toe slopes from the bordering steeper mountain slopes. Refer to the discussion of the proposed action and table 3-9 for additional soil information.

## Visual Resources

Similar to the proposed action, the significant adverse visual resource impacts for the Thistle Creek Variation would include contrasts from modifications of landform and vegetation, as noted in table 4-26. No impacts would occur from the addition of structures. Refer to the proposed action discussion for a further explanation and to table 4-2 for a summary of VRM Class impacts.

TABLE 4-26

SIGNIFICANT ADVERSE VISUAL RESOURCE IMPACTS OF THE THISTLE CREEK VARIATION

| MP | Affected Landscape Feature[1] | Critical Viewpoint[2] | Duration of Impact[3] | Contrast Rating Feature Score[4] | VRM Class[5] |
|---|---|---|---|---|---|
| **PIPELINE** | | | | | |
| MP 0-MP 10 | Landform, vegetation | U.S. Highway 6/50 | Long Term | 26/22/- | 2 |
| MP 10-MP 23 | Landform, vegetation | U.S. Highway 89 | Long Term | 22/18/- | 3 |
| **ANCILLARY FACILITIES** | | | | | |
| No ancillary facilities along the variation would create any significant adverse impacts. | | | | | |

[1]The composition of the characteristic landscape would be modified by changing the landform, water form, or vegetation or by adding a structure to the landscape.

[2]A critical viewpoint is the point where the proposed change would be most apparent.

[3]Duration of impact can be described as:
Temporary--During construction through first or second growing season.
Short term--For 2 to 5 years following construction.
Long term--5 years to project life to (20 years) or longer.

[4]Contrast Rating Feature Score is a value which the contrast of a specific area could not exceed without creating a significant adverse visual impact. VRM Class 2 and VQO R both have a Feature Score of 12. VRM Class 3 and VQO PR both have a Feature Score of 16. VRM Class 4 and VQO M,MM both have a Feature Score of 20. See appendix I for further explanation.

[5]See table 3-10 for definitions of terms.

NOTE: Variation 2 would deviate from the proposed action between MP 156 and MP 176.

## Land Uses: Agriculture

The Thistle Creek Variation would temporarily disturb 61 acres of cropland which would be successfully restored within 1 to 2 years.

## Topography

The Thistle Creek Variation could encounter approximately 4 miles of sidehill construction in Soldier Creek Canyon.

# VARIATION 3--EAST LAS VEGAS VARIATION

## Vegetation

The East Las Vegas Variation would affect 715 acres of vegetation. The understory could be capable of returning to preconstruction densities within 5 years of construction. The overstory vegetation of the creosote bush type (715 acres) would require longer than 5 years to return to preconstruction proportions.

The acres of each vegetation type which would be temporarily or permanently removed by the East

Las Vegas Variation are shown in table 3-1. Joshua trees and cacti (scattered within the 715 acres of creosote bush vegetation type) could be affected. One-half acre of riparian vegetation would be crossed.

## Wildlife

Desert bighorn sheep ranges would be affected by the East Las Vegas Variation for an estimated 2 miles (24 acres), while the portion of the proposed action it would replace would cross an estimated 6 miles (73 acres) of sheep range. The types of impacts would be the same as those noted for the proposed action.

## Soils

The East Las Vegas Variation would disturb 715 acres of soils, most strongly affected would be 206 acres of Soil Group 5, 73 acres of Soil Group 6, and 715 acres of Soil Group 9. This variation would cross the Las Vegas Wash area in a broader floodplain than would the proposed action, but it would avoid the portion requiring critical erosion treatment. Refer to the discussion of the proposed action and table 3-9 for additional soil information.

## Visual Resources

Similar to the proposed action, the significant adverse visual resource impacts from the East Las Vegas Variation would include contrasts created by modification of vegetation, as noted in table 4-27. No significant impacts would occur from the addition of structures or landform modification. Refer to the proposed action discussion for further explanation and to table 4-2 for a summary of VRM Class impacts.

TABLE 4-27.

SIGNIFICANT ADVERSE VISUAL RESOURCE IMPACTS OF THE EAST LAS VEGAS VARIATION

| MP | Affected Landscape Feature[1] | Critical Viewpoint[2] | Duration of Impact[3] | Contrast Rating Feature Score[4] | VRM Class[5] |
|---|---|---|---|---|---|
| **PIPELINE** | | | | | |
| MP 3-MP 8 | Vegetation | Las Vegas Dunes Recreation Lands | Long Term | -/16/- | 3 |
| MP 27-MP 42 | Vegetation | Proposed McCullough National Natural Landmark | Long Tern | -/16/- | 2 |
| **ANCILLARY FACILITIES** | | | | | |
| No ancillary facilities along the variation would create any adverse significant impacts. | | | | | |

[1]The composition of the characteristic landscape would be modified by changing the landform, water form, or vegetation or by adding a structure to the landscape.

[2]A critical viewpoint is the point where the proposed change would be most apparent.

[3]Duration of impact can be described as:
Temporary--During construction through first or second growing season.
Short term--For 2 to 5 years following construction.
Long term--5 years to project life to (20 years) or longer.

[4]Contrast Rating Feature Score is a value which the contrast of a specific area could not exceed without creating a significant adverse visual impact. VRM Class 2 and VQO R both have a Feature Score of 12. VRM Class 3 and VQO PR both have a Feature Score of 16. VRM Class 4 and VQO M,MM both have a Feature Score of 20. See appendix I for further explanation.

[5]See table 3-10 for definitions of terms.

NOTE: Variation 3 would deviate from the proposed action between MP 488 and MP 544.

# VARIATION 4--FORT MOJAVE VARIATION

## Vegetation

The Fort Mojave Variation would affect 120 acres of vegetation. The understory vegetation would be capable of returning to preconstruction densities within 5 years; the overstory of creosote bush vegetation type or (120 acres) would require longer to reestablish.

The acres of each vegetation type which would be temporarily or permanently removed by the Fort Mojave Variation are shown in table 3-1. A loss of less than 1 acre of riparian vegetation would occur for the life of the project (20 years). Joshua trees and cacti (scattered within 120 acres of creosote bush vegetation) could be affected.

## Wildlife

Except for magnitude, impacts to the state listed desert tortoise from the construction of this variation would be the same as those noted in the discussion of the proposed action.

## Soils

The Fort Mojave Variation would disturb 121 acres of soils. The following acreages would be most strongly affected: 24 acres of Soil Group 2, 12 acres of Soil Group 3, 109 acres of Soil Group 6, 24 acres of Soil Group 8, and 121 acres of Soil Group 9. Refer to the discussion of the proposed action and table 3-9 for additional soil information.

# VARIATION 5--MILL CREEK VARIATION

## Vegetation

The Mill Creek Variation would affect 253 acres of vegetation. The overstory (253 acres) would require longer than 5 years to return to preconstruction densities. A loss of 57 acres of forest, pinyon-juniper, and mountain brush vegetation types would occur for the life of the project (20 years). Approximately .2 acres of riparian vegetation would be temporarily lost.

## Wildlife

The Mill Creek Variation would cross about 21 miles (253 acres) of big game winter ranges, while the portion of the proposed action it replaced would cross about 11 miles (133 acres) of big game range. Harassment would be the same as that discussed for the proposed action.

## Soils

The Mill Creek Variation would disturb 255 acres of soils in Soil Group 1. The variation would generally be similar to the proposed action, except that it would disturb areas of smoother toe slopes along a mountain valley and smooth sloping mountain ridges to its intersection of the proposed action. This area would be less susceptible to erosion and landslide potential. Refer to the discussion of the proposed action and table 3-9 for additional soil information.

## Visual Resources

Similar to the proposed action, the significant adverse visual resource impacts from the Mill Creek Variation would include contrasts caused by modifications of landform and vegetation, as noted in table 4-28. No significant impacts would occur from the addition of structures. Refer to the proposed action discussion for a further explanation and to table 4-2 for a summary of VRM Class impacts.

TABLE 4-28

SIGNIFICANT ADVERSE VISUAL RESOURCE IMPACTS OF THE MILL CREEK VARIATION

| MP | Affected Landscape Feature[1] | Critical Viewpoint[2] | Duration of Impact[3] | Contrast Rating Feature Score[4] | VRM Class[5] |
|---|---|---|---|---|---|
| **PIPELINE** | | | | | |
| MP 0-MP 6 | Landform, vegetation | U.S. Highway 6/50 | Long Term | 22/ 16/- | 2 |
| **ANCILLARY FACILITIES** | | | | | |
| No ancillary facilities along the variation would create any adverse significant impacts. | | | | | |

[1]The composition of the characteristic landscape would be modified by changing the landform, water form, or vegetation or by adding a structure to the landscape.

[2]A critical viewpoint is the point where the proposed change would be most apparent.

[3]Duration of impact can be described as:
Temporary--During construction through first or second growing season.
Short term--For 2 to 5 years following construction.
Long term--5 years to project life to (20 years) or longer.

[4]Contrast Rating Feature Score is a value which the contrast of a specific area could not exceed without creating a significant adverse visual impact. VRM Class 2 and VQO R both have a Feature Score of 12. VRM Class 3 and VQO PR both have a Feature Score of 16. VRM Class 4 and VQO M,MM both have a Feature Score of 20. See appendix I for further explanation.

[5]See table 3-10 for definitions of terms.

NOTE: Variation 5 would deviate from the proposed action between MP 156 and MP 169.

## Topography

The Mill Creek Variation could require about 5 miles of sidehill construction if it followed the road in Spanish Fork Canyon. Four miles of this could be partially avoided by locating the right-of-way on the south side of the canyon; sidehill construction along this segment could probably be avoided altogether by moving the right-of-way into the hills immediately north of the canyon. An additional mile of sidehill construction would be needed between about MP 11 and MP 12.

# VARIATION 6--DANIELS CANYON VARIATION

## Vegetation

The Daniels Canyon Variation would affect 557 acres of vegetation. The overstory vegetation on all vegetation types would require longer than 5 years to return to preconstruction densities. A loss of 112 acres of forest, pinyon-juniper, and mountain brush vegetation would occur for the life of the project (20 years). Approximately 2 acres of riparian vegetation would be temporarily lost.

## Wildlife

The Daniels Canyon Variation would cross about 17 miles (206 acres) of big game winter range, while the proposed route would cross about 4 miles (48 acres) in this area. Types of impacts would be the same as those discussed for the proposed action.

This variation would cross an estimated 8 miles (97 acres) of sage grouse range, while the portion of the proposed action it replaced would cross about 5 miles (961 acres) of grouse habitat. The types of impacts would be identical with those listed for the proposed action.

A portion of the proposed route would cross about 10 miles (121 acres) of waterfowl habitat, while the variation would cross about 9 miles of waterfowl habitat (109 acres). Types of impacts for this species would not differ for the variation and the proposed action.

## Soils

The Daniels Canyon Variation would disturb 630 acres of soils, 558 acres of which would be in Soil Group 1. This variation would be located in a narrow valley bordered by very steep mountain side slopes between MP 12 and MP 48. Impact to soils would be minimized only if the roadbed were utilized for the right-of-way. Otherwise, the steep mountain side slopes would be subject to high erosion hazard and landslide potential. Refer to the discussion of the proposed action and table 3-9 for additional soil information.

## Visual Resources

Similar to the proposed action, the significant adverse visual resource impacts for the Daniels Canyon Variation would include contrasts caused by modifications of landform and vegetation, as noted in table 4-29. No significant impacts would occur from the addition of structures. Refer to the proposed action discussion for a further explanation and to table 4-2 for a summary of VRM Class and VQO impacts.

TABLE 4-29

SIGNIFICANT ADVERSE VISUAL RESOURCE IMPACTS OF THE DANIELS CANYON VARIATION

| MP | Affected Landscape Feature[1] | Critical Viewpoint[2] | Duration of Impact[3] | Contrast Rating Feature Score[4] | VRM and VQO Class[5] |
|---|---|---|---|---|---|
| **PIPELINE** | | | | | |
| MP 5-MP 6 | Vegetation | Heber City, U.S. Highways 40, 189 | Long Term | -/19/- | 2 |
| MP 11-MP 30 | Landform, vegetation | U.S. Highway 40, Daniels Creek | Long Term | 24/18/- | 2,R |
| MP 30-MP 38 | Vegetation | Strawberry Reservoir Recreation areas | Long Term | -/13/- | R |
| MP 50-MP52(END) | Vegetation | FS road | Long Term | -/16/- | R |
| **ANCILLARY FACILITIES** | | | | | |
| No ancillary facilities along the variation would create any adverse significant impacts. | | | | | |

[1]The composition of the characteristic landscape would be modified by changing the landform, water form, or vegetation or by adding a structure to the landscape.

[2]A critical viewpoint is the point where the proposed change would be most apparent.

[3]Duration of impact can be described as:
Temporary--During construction through first or second growing season.
Short term--For 2 to 5 years following construction.
Long term--5 years to project life to (20 years) or longer.

[4]Contrast Rating Feature Score is a value which the contrast of a specific area could not exceed without creating a significant adverse visual impact. VRM Class 2 and VQO R both have a Feature Score of 12. VRM Class 3 and VQO PR both have a Feature Score of 16. VRM Class 4 and VQO M,MM both have a Feature Score of 20. See appendix I for further explanation.

[5]See table 3-10 for definitions of terms.

NOTE: Variation 6 would deviate from the proposed action between MP 108 and MP 156.

## Land Uses: Recreation Resources, Agriculture, and Conflicts with Land Use Plans, Policies, and Controls

### RECREATION RESOURCES

Pipeline construction activity along Daniels Canyon could affect fishing along Daniels Creek and sightseeing along the canyon. Minor, short term impacts such as visual intrusions, noise and dust generated by construction, and some traffic delays could diminish the quality of the fishing, sightseeing, and hunting. In general, public sensitivity toward pipeline construction through the Daniels Canyon would be low to medium.

The variation would follow the general alignment of Forest Road #71031, the west shore road of the Strawberry Reservoir. The west shore road is the main access road to several recreation facilities along the reservoir. Noise, dust, and odors caused by construction would cause significant short term impacts to recreational experiences.

### AGRICULTURE

The Daniels Canyon Variation would temporarily disturb 73 acres of cropland, which would be successfully restored within 1 to 2 years.

### CONFLICTS WITH LAND USE PLANS, POLICIES, AND CONTROLS

If the pipeline were constructed within the clearing limits of the existing roads, there would be no conflicts with the visual resource as covered in the Uinta National Forest Corridor Rule. The Daniels Canyon Variation would not be in a designated corridor based on all of the criteria in the Corridor Rule.

## Topography

The Daniels Canyon Variation would require about 11 miles of sidehill construction in the canyon between MP 12 and MP 23. If the roadbed could be used for the right-of-way, less sidehill construction would be necessary.

# Chapter 5
# Conclusions, Recommendations, and Preferred Alternative

## FERC ENVIRONMENTAL STAFF CONCLUSIONS AND RECOMMENDATIONS

Information provided by the applicant and further developed from field investigations, literature research, special studies, and contacts with local, state, and Federal agencies indicates that the environmental impact associated with the construction and operation of the RMPP would have a limited adverse environmental impact and that the proposed project is environmentally acceptable, assuming the FERC finds there is a need for it.

Several total system alternatives to the RMPP were investigated. The Northern Systems Alternative would use the reversible flow capability of Northwest's facilities and would take advantage of the spare capacity available in the 42-inch diameter Western Leg system. It is the only total system alternative that is preferable environmentally to the proposed project. It would require significantly less pipeline construction than the RMPP. To transport 413,000 Mcfd, the Northern Systems Alternative would require construction of 76.8 miles of pipeline and perhaps another 148.3 miles of pipeline south of Antioch, California. This alternative might require that 380 miles of 42-inch diameter pipeline for the Western Leg of the ANGTS be prebuilt. Any prebuilt portion of the Western Leg is not considered to be attributable to the Northern Systems Alternative because the Western Leg will eventally be built as part of the ANGTS.

The construction of 76.8 miles of pipeline and at most 225.1 miles is clearly superior to the minimum facility requirement--610 miles of pipeline-- for the proposed project. The Northern Systems Alternative is also superior to the proposed project because it would be constructed entirely on or adjacent to existing pipeline rights-of-way, whereas the RMPP would have to establish a new utility corridor through many areas.

However, the Northern Systems Alternative would consume more fuel to transport the gas than the RMPP. If the Western Leg were prebuilt, the alternative would consume 17,160 Mcfd of fuel gas, 5.9 times more fuel than the proposed project. Following completion of the Western Leg, it would require 27,780 Mcfd of fuel gas, 9.55 times more. The FERC environmental staff believes the potential fuel use penalty does not represent a significant deterrent to the Northern Systems Alternative at the 413,000-Mcfd level for the following reasons. First, worst-case assumptions were used to derive the fuel use figures. These figures could decrease because of gas supply uncertainties, such as the lack of any significant gas supply to support the RMPP, the prospect of reduced deliveries from Canada after 1982, and the potential impact of reduced demand when gas prices are deregulated. Second, there is a lack of information about the actual facility and fuel requirements on Northwest's system.

The FERC environmental staff believes that fuel use is primarily an economic issue. The cost of fuel must be compared to the capital cost differential of the alternative versus the RMPP. Such a comparison is beyond the scope of this EIS. The relative economics of the Northern Systems Alternative versus the RMPP, the gas supply available to the project, and other factors will be given full consideration in the later phases of the certification process before the FERC.

There are numerous and significant environmental advantages to the alternative. For example, facilities for the Northern Systems Alternative could be constructed as they are needed, i.e., in phases as gas supply develops. No facilities, except for prebuilt portions of the Western Leg, would be required until after 330,000 Mcfd of Rocky Mountain gas have become available. This is environmentally preferable because it would significantly reduce the environmental impact that would occur if the volume of gas proposed for this project did not materialize. Additional information comparing the proposed project to the Northern Systems Alternative appears in the 'Comparative Analysis of RMPP and Alternatives' in chapter 2.

Therefore, the FERC environmental staff finds that the Northern Systems Alternative is a *significantly superior* alternative to the proposed project. The FERC environmental staff believes that unless it can be demonstrated that the alternative is economically or otherwise inferior, the proposed project should not receive FERC approval since it is not environmentally equivalent to or better than the Northern Systems Alternative. Selecting the Northern Systems Alternative would not foreclose the possibility of constructing the RMPP in the future. It would only delay the commitment to construct another totally new pipeline system from the Rocky Mountain region. Furthermore, since the applicant

has not identified the availability of any gas that cannot be moved by other means at this time, no delivery of gas would be foreclosed.

However, if throughput levels for the RMPP were to reach a higher level such as 800,000 Mcfd, the FERC environmental staff concludes that both the Northern Systems Alternative and the RMPP would be environmentally acceptable transportation systems. The proposed system would be more fuel efficient than the alternative, but the Northern Systems Alternative would be at least 153.7 miles shorter than the proposed project. The environmentally preferable system would still be the Northern Systems Alternative; however, at this level, factors such as economic and fuel use questions could override the environmental advantages of this alternative.

The Fort Mojave Variation within California falls under the jurisdiction of the CPUC. However, the FERC environmental staff has analyzed both the proposed route and this variation and believes that both routes are environmentally acceptable.

The East Las Vegas Variation was examined mainly because of the local controversy surrounding the proposed project's crossing of the Rainbow Gardens area and the Las Vegas Wash. The Rainbow Gardens is a proposed National Natural Landmark, and the Las Vegas Wash is a proposed wetlands park. Although the variation would cross the McCullough Range, also a proposed National Natural Landmark, no significant impact to it would occur. In a letter dated January 5, 1981, the Clark County Department of Comprehensive Planning recommended, among other things, that the RMPP avoid the Rainbow Gardens National Heritage Site and the proposed Las Vegas Wash park and that it utilize a route which follows the proposed Clark County Advanced Wastewater Treatment Plant export pipeline route (the East Las Vegas Variation). The variation would also follow the proposed Interstate Route I-515 for about 4 miles near Henderson, Nevada. The proposed route that would be replaced by this section of the East Las Vegas Variation would not be located within any existing or proposed utility corridor. See map S-22 in the *Graphic Supplement* for these corridors. Consequently, the East Las Vegas Variation is environmentally preferable.

If the proposed project is certificated, the environmental staff recommends that the following conditions be included in the FERC's certificate to further mitigate the environmental impact.

1. The applicant shall use the East Las Vegas Variation from MP 487.7 to MP 543.9 of the RMPP.

2. To guard against pipeline rupture resulting from fault displacement at the crossing of the Wasatch fault, the applicant shall use appropriate design measures and construction techniques including, but not limited to, shallowly dipping trench walls, granular backfill, and fault crossing orientation to avoid pipeline compression during faulting. The magnitude of fault displacement used for system design shall be at least as great as the largest single historic displacement on any portion of the fault and should be equivalent to the displacement having a mean recurrence interval of 10,000 years.

3. The applicant shall apply to the Wyoming Department of Environmental Quality, Division of Air Quality, for a PSD applicability determination for the Sage Compressor Station. The results of this determination shall be filed with the FERC, along with a copy of any required PSD application.

4. To avoid conflicts with planned water pipeline construction, the applicant shall contact the North Las Vegas Department of Public Works before construction begins.

5. RMPC shall design and construct the Sage Compressor Station so that noise impact at nearby existing residences will not exceed an $L_{dn}$ of 55 dB(A).

6. The proposed project shall not be constructed until the RMPC has firm transportation contracts in excess of at least 100,000 Mcfd of gas for the life of the project. (See chapter 2 'Low Flow Alternative,' for a discussion of existing transmission capacity.)

## LAND MANAGING AGENCIES' PREFERRED ALTERNATIVE

The responsibilities of the Federal land managing agencies relate to the issuance of grants of rights-of-way across Federal lands and the assessment of environmental impacts associated with the proposed action and alternate routes. The Federal Energy Regulatory Commission staff has also participated in these assessments.

Based on the assessment of all alternatives, The Department of Interior land managing agencies have found that the proposed route is acceptable and reasonable, with the following variations:

- Daniels Canyon (Variation 6), and

- Thistle Creek (Variation 2), or Mill Creek (Variation 5), if 2 is not possible.

The East Las Vegas (Variation 3) and Fort Mojave (Variation 4) Variations are acceptable if the right-of-way for the proposed action cannot be obtained from the City of Henderson and Clark County and the Fort Mojave Indian Reservation.

The Federal Energy Regulatory Commission staff and U.S. the Forest Service, Department of Agriculture find the environmentally preferred alternative to be the Northern Systems. This is also acceptable and reasonable to the Department of the Interior land managing agencies.

# LIST OF PREPARERS FOR THE ROCKY MOUNTAIN PIPELINE PROJECT EIS

| Agency Personnel | Education | EIS Responsibility |
|---|---|---|
| **BLM** | | |
| Janis L. Bowles, Project Leader | BA, Environmental Studies | Project Leader<br>Comparative Analysis, Land Managing Agencies' Preferred Alternative, Quality Control |
| Richard E. Traylor, Environmental Project Specialist | BS, Forestry<br>MS, Forest Management | Environmental Coordinator, Quality Review |
| Alan E. Amen, Soil Scientist | BS, General Agronomy | Soils, Agriculture, Soils and Agriculture Technical Report |
| Raymond J. Boyd, Wildlife Biologist | BS, General Science<br>BS, Game Management<br>MS, Range Management Report | Wildlife, Threatened and Endangered Species, Terrestrial and Aquatic Biology Technical Report, Threatened and Endangered Species Technical Report |
| Gerald P. Brandvold, Botanist | BS, Range Management | Vegetation, Forestry, Livestock, Appendix C, Terrestrial and Aquatic Biology Technical Report, Threatened and Endangered Species Technical Report |
| Larcie D. Burnett, Archaeologist | BA, Anthropology<br>MA, Anthropology | Cultural Resources, Cultural Resources Technical Report |
| Roger Carmichael, Engineer | BS, Mechanical Engineering<br>MS, Environmental Engineering | Overview, Route Alternatives and Variations, Appendix F |
| Donald E. Clark, Community Planner | BS, Landscape Design | Land Use Plans, Native American Issues, Land Status data compilation |
| George E. Detsis, Environmental Specialist | BS, Recreation Administration<br>MS, Forest Resources | Authorizing Actions, Recreation Resources Transportation Systems, Wilderness, Appendix D, Recreation and Wilderness Technical Report, Transportation Networks Technical Report |
| Catharine A. Eckberg, Writer-Editor | BS, Environmental Planning | Editing |
| Jack D. Edwards, Economist | BA, Education<br>MS, Agricultural Economics<br>PhD, Economics | Appendix A and Portions of Appendix C |
| Gary R. Konwinski, Geologist | BS, Soil Science<br>MS, Environmental Science<br>Graduate Work in Geology and Water Resources | Water Resources, Water Resources Technical Report |

## LIST OF PREPARERS FOR THE ROCKY MOUNTAIN PIPELINE PROJECT EIS—Continued

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| Janet J. Parker, Writer-Editor | Working toward degrees in English, Chemistry | Editing; BLM EIS sections, BLM Technical Reports; Production of EIS and all Technical Reports |
| Stanley V. Specht, Landscape Architect | BS, Landscape Architecture<br>MLA, Landscape Architecture<br>MUP, Urban Planning<br>Graduate Work in Arctic Engineering | Visual Resources, Visual Resources Technical Report |
| Pete Van Wyhe, Supervisory Printing Specialist | BS, Business Management | Production of *Graphic Supplement,* EIS, and Technical Reports |
| Keith Francis, Lead Professional Cartographer | BA, Geology<br>MS, Remote Sensing | Cartographic and Graphic, Work on *Graphic Supplements,* some EIS Graphics; BLM Technical Report Graphics |
| Troy Bunch, Illustrator | AA, Art<br>AAS, Audio-Visual Production | Cover, Technical Illustrations and Graphics in Technical Reports; EIS Graphics |
| Connie A. Hackathorn, Professional Cartographer | Cartography, Psychology | Cartographic and Graphic Production of Technical Reports, *Graphic Supplement* |
| **FERC** | | |
| Kenneth D. Frye, Chemical Engineer | BS, Chemical Engineering | Project Manager<br>Purpose and Need, Description of Proposed Action, FERC Environmental Conclusion and Recommendations, Quality Control |
| Ann R. Aldrich, Technical Editor | BA, English<br>MS, English<br>PhD, English | Editing; Production Coordination |
| James P. Daniel, Environmental Biologist | BS, Wildlife<br>Graduate Work in Environmental Biology | Mitigating Measures, Appendix C |
| Robert E. Klipfel, Jr., Civil Engineer | BS, Civil Engineering<br>MS, Civil & Environmental Engineering | Appendix E |
| John E. Korzeniowski, Chemical Engineer | BS, Chemical Engineering<br>Graduate Work in Environmental Medicine and Toxicology | Air Quality, Noise Quality, Pipeline Safety, Comparative Analysis |
| John S. Leiss, Geologist | BS, Earth & Planetary Sciences<br>Graduate Work in Geology | Geology and Topography, Comparative Analysis |
| Cary D. Secrest, Soil Conservationist | BS, Soil Science | Socioeconomics, Comparative Analysis, Socioeconomics Technical Report |
| Allan V. Straughan, Physical Scientist | BS, Environmental Health | Energy Conservation, Appendix B |

| | | |
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| | | |
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# Glossary

ALLUVIAL FANS--Fan-shaped deposits composed of eroded soil materials.

ALLUVIUM--Clay, silt, sand, gravel, or other loose stream-deposited material.

AMBIENT NOISE LEVELS--Expected background noise in an area.

ANIMAL UNIT MONTH--The amount of forage a cow and a calf (six months of age and under) would consume in 1 month. This unit is used to calculate carrying capacity and serves as a base for grazing fees.

ANCILLARY FACILITIES--Structures (compressor stations, power and communications lines, cathodic protection systems) which are necessary for the continuous operation or maintenance of the pipeline.

ASH FALLS--Deposition of airborne volcanic ash downwind from a volcano.

BACKFILL--Earth replaced after being excavated during construction.

BACKHOE--Self-propelled machine with an arm equipped with toothed shovel that scoops earth as the shovel is pulled toward the machine.

BADLAND--A landscape devoid of vegetation and eroded into an intricate maze of narrow ravines and sharp crests.

BERM--A slightly rounded crown of soil provided over the pipeline trench to compensate for settling of the backfill.

BIOME--A geographical area where plants exhibit similar characteristics.

BLADED OUT--To level the earth's surface with heavy equipment.

BLOCK VALVE--A valve which can be closed to isolate one section of pipe from the adjacent section.

BOOSTER STATION--Compressor station.

BORROW PIT--A pit from which earthern materials are excavated for use elsewhere.

BRAIDED STREAM--A stream that flows in several dividing and reuniting channels.

CATHODIC PROTECTION--Anticorrosion technique for metal installations-- pipelines, tanks, buildings-- in which weak electric currents are set up to offset the current associated with metal corrosion.

CHECK DAMS--An aboveground barrier built from timber and spaced on alternate sides of the right-of-way to break the flow of water runoff. Small dams used to control water flow during and after construction.

CHECK VALVE--Valve with a free-swinging tongue or clapper that permits fluid in a pipeline to flow only in one direction.

CHISELING--The loosening of soil without inversion and with a minimum of mixing of the surface soil, in order to shatter restrictive layers (below normal plow depth) that could inhibit water movement or root development (called 'chiseling' when the restrictive layers are less than 16 inches deep).

COATING AND WRAPPING--An inert material coating pipeline and other buried facilities to protect the system from corrosion.

COFFERDAMS--Earthen dams used at stream crossings to expose the streambed during construction.

CORRIDOR--A mile-wide strip of land which the proposed project would be located within.

CROSS DITCHES--An earthen dam built at a 45-degree angle to the right-of- way to divert water across the right-of-way as quickly as possible and prevent backfill material from washing away.

CULTURAL RESOURCES--Those fragile and nonrenewable evidences of human activity, occupation, or endeavor, reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features, that were of importance in human events. Cultural resources are further categorized in terms of their prehistoric and historic values; however, each of these aspects represents a part of the continuum of events from the earliest evidences of man to the present day.

DESERT PAVEMENT--A wind-eroded, smooth surface composed of rock fragments which protect underlying fine soil particles from further erosion.

DEWATERING--Removing water from the soil and/ or a pipeline trench to aid construction.

DISPATCHER--Employee responsible for scheduling and controlling movement of natural gas through pipelines.

DISPERSED RECREATION--Camping in undeveloped sites and informal daytime recreation.

DIVERTING METHOD--A method of installing pipe in streams where the flow is temporarily diverted.

DOUBLE-DITCHING--The practice of separating the topsoil from the subsoil during trench excavation.

# GLOSSARY

DOUBLE-JOINTING YARD--An assembly area where two sections of pipe are welded together and coated.

DURIPAN (Includes Hardpan)--A hardened or cemented soil horizon or layer. The soil material is sandy, loamy, or clayey and is cemented by silica, calcium carbonate, or other substance.

EASEMENT--Interest in land owned by another that entitles its holder to a specific limited use.

FAULT (Geotechnical)--Fracture in the earth's crust accompanied by a potential shifting of one side of the fracture in relation to the other side; the point at which a geological strata "breaks off" or is sheared when a section of the strata drops because of settling.

FAULTING--The process of producing a fault, a surface or zone of rock fracture along which there has been displacement. Faulting generally extends into unconsolidated sediments on top of the faulted rock.

FEE TITLE--An estate of inheritance in land without limitation to any particular class of heirs or restrictions. Fee title is usually obtained for compressor station and maintenance base sites on private lands. (See also EASEMENT.)

FIELD--A geographic area in which wells produce from a continuous reservoir. Generally refers to the surface area, although it may refer to both the surface and the underground productive formations. Generally includes several pools and may include several separate reservoirs.

FLOW CONTROL VALVE--A valve which manually or automatically controls the quantity of natural gas flowing through the pipe.

FORB--A low growing broadleaf plant.

FOSSIL FUELS--Any hydrocarbon deposit that may be used for fuels; examples are petroleum, coal, and natural gas.

FRENCH DRAIN--A rock or gravel fill used to drain water.

FUGITIVE DUST--Airborne silt and clay particles.

g--The acceleration of gravity. Numerical value: 32 feet per second per second or 980 centimeters per second per second. Used in the EIS as a measure of the severity of ground motion.

GALLINACEOUS GUZZLERS--Artificial watering devices for quail, chukar, pheasant, etc., developed to protect these birds from predators.

GRADE--Degree of slope of a road, channel, or natural ground.

*GRAPHIC SUPPLEMENT*-- Map volume of the RMPP EIS.

GROUND MOTION--Vibration of the ground during an earthquake without permanent displacement. As used in this EIS, ground motion values relate to vibration in bedrock.

HERPETOFAUNA--Snakes, lizards, turtles, frogs, and other cold-blooded animals.

HINGELINE AREA--A portion of the North American Overthrust Belt, an area of potential oil and gas reserves in central and southern Utah, possibly extending into Nevada and Arizona.

HYDROCARBON FUELS--Fuel consisting of hydrogen and carbon such as oil, natural gas, etc.

HYDROSTATIC TESTING--Filling a pipeline or tank with water under pressure to test tensile strength.

INFRASTRUCTURE--The facilities, equipment, and services needed for a community to function. It includes roads, sewers, waterlines, police, fire protection, schools, etc.

INSECTIVORES--Relatively small insect-eating mammals (shrews, moles, etc.).

INTENSIVE FIELD INVENTORY--A complete surface inventory of a specific area.

INTERMITTENT STREAM--A stream which flows only during periods of precipitation.

LEKS--Sagegrouse strutting ground (courtship areas) generally found in open grassy areas and sagebrush.

LIQUEFACTION--Temporary transformation of a saturated cohesionless soil into a liquid similar to quicksand. The stimulus for the transformation is a jolt or shaking from earthquakes, explosions, etc.

LOOP--New section of pipeline parallel to an existing pipeline.

MAINLINE PIPE--The principal transporting pipe.

MANAGEMENT FRAMEWORK PLAN--BLM land use planning document.

MATS--A steel mesh net used to prevent materials from being thrown during blasting. A wood platform used in sets to support machinery on soft ground.

MEAN RECURRENCE INTERVAL--The period of time expected to pass between occurrences of some periodic event, based on a statistical evaluation of past occurrences. It is not an absolute value in a predictive sense. Fifty percent of the intervals would be shorter than the mean recurrence interval; 50 percent would be longer.

MITIGATION--The abatement of diminution of construction impact to the environment by (1) avoiding a certain action or parts of an action, (2) employing certain construction measures to limit the degree of impact, (3) restoring an area to preconstruction

conditions, (4) preserving or maintaining an area throughout the life of a project, or (5) replacing or providing substitute resources to the environment.

MULCH--An erosion control method consisting of spreading materials such as wood chips or straw on the soil surface to prevent evaporation or erosion or to enrich the soil.

NATIONAL REGISTER OF HISTORIC PLACES--A list of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture.

NONATTAINMENT AREA--A 'prevention of significant deterioration' area designated by EPA that exceeds the national ambient air quality standards for any of the six criteria pollutants.

OVERSTORY--A layer of vegetation, usually shrubs or trees, that forms a secondary layer of vegetation.

OVERTHRUST BELT--A portion of the North American Overthrust Belt whose proven and potential oil and gas resources lie in a generally north-south direction extending from Canada to Mexico; specifically, through Montana and along the western boundaries of Wyoming, Colorado, and northern Utah.

PEDIMENTS--Broad, flat or gently sloping, rock-floored erosion surfaces typically developed in an arid or semiarid region at the base of an abrupt mountain front. They are underlain by bedrock which may or may not be covered with a thin, discontinuous veneer of alluvium.

PETROGLYPHS--Figures, symbols, or scenes pecked or etched in rock.

PHYSIOGRAPHIC PROVINCES--Geographic regions that have distinct landforms resulting from significantly different geologic structures and climate.

PICTOGRAPHS--Painted pictures of animals, men, mythical beings, and geometric or curvilinear designs.

PIPELINE WELDING--Bringing bevelled ends of two joints together and aligning them with line-up clamps. Qualified welders, under strict quality control conditions, join two sections of pipe using courses of weld-metal called beads in a series of passes designated as: 1) stringer bead, 2) hot pass, 3) third pass or hot fill (for heavy-wall pipe), 4) filler pass, and 5) final or capping pass.

PLAYAS--Level areas at the bottom of desert basins that are periodically flooded with water. Floodwater either evaporates or percolates into the playa bottom. Many playas are salty.

POOL--Underground oil or gas accumulation in porous and permeable rock produced by one or more wells.

POSSIBLE RESERVES--According to the Potential Gas Committee, the estimated quantity of gas available from new field discoveries in formations productive elsewhere within the same geologic province.

PREBUILD--To construct portions of a proposed pipeline system so that they can be used in conjunction with existing systems before the new system begins operation.

PRIME AGRICULTURAL LAND (also Prime Farmland)--Land that is best suited for producing food, feed, forage, fiber, and oilseed crops. The inventory of prime agricultural land is maintained by the USDA Soil Conservation Service.

PROBABLE RESERVES--According to the Potential Gas Committee, the estimated quantity of gas available by extending existing pools or discovering new pools in reservoirs productive elsewhere in existing fields; also, new pools within existing fields in formations productive elsewhere in the same geologic province.

PROVEN RESERVES--According to the Potential Gas Committee, the current estimated quantity of gas which geologic and engineering data demonstrate to be recoverable from known reservoirs under existing economic and operating conditions.

RECREATION RESOURCES--Formally designated areas and informal dispersed areas that are managed by Federal, state, and local agencies in order to preserve and further their use for play, amusement, or relaxation.

RELIEF VALVE--Valve that is set to open when pressure reaches a predetermined level.

RESERVOIR (petroleum)--A subsurface porous and permeable rock body in which oil and/or gas occur.

RETAINING WALL--A concrete, rock, or timber wall built from below the water level of a stream to a point above the high water level to control bank erosion.

REVETMENT--A measure to control bank erosion using a footing below the water level using a cofferdam. From this footing, two layers of riprap are laid up to the water level. This method continues up the slope or bank, using a single layer.

RIPARIAN VEGETATION--Vegetation which grows in and is dependent upon moist or wet soils.

RIPRAP--A foundation or erosion control device consisting of rocks thrown together without order.

ROCKLAND--Rough and broken land comprised mainly of rock outcrops.

# GLOSSARY

SALINE SOIL--A soil containing soluable salts in a concentration that impairs growth of plants.

SCOPING MEETING--A public meeting designed to determine significant environmental issues and concerns related to a proposed action.

SEISMIC EVENT--Earthquake.

SHALLOW SOILS--A soil where bedrock is within 20 inches of the surface.

SITE (CULTURAL RESOURCES)--A physical location of past human activities or events. It is a discrete locus of activity that is presumably interpretable. A site may be indicated by clusters of objects, presence of features, or occurrence of subsurface cultural bearing deposits. It is recognized that cultural resource sites are extremely variable in size and shape and may consist of secondarily deposited cultural resource remains.

SPECULATIVE RESERVES--According to the Potential Gas Committee, the estimated quantity of gas available either from new pool or field discoveries in formations not previously productive within a productive geologic province or from new field discoveries within a geologic province not previously productive.

SPREAD--A team of construction personnel and equipment required to construct an identified segment of pipeline.

STRATIGRAPHY--A branch of geology dealing with the classification, correlation, and interpretation of stratified rocks. Also, the sequence and description of such rocks in a specific area.

STRINGING PIPE--Placing sections of pipe end to end along a pipeline right-of-way in preparation for welding the joints together to form a pipeline.

SUBSIDENCE--A downward settling or sinking of the earth's surface with little or no horizontal motion (not the result of a landslide or slope failure). The term is not restricted by the rate, magnitude, nor area extent of the phenomenon. The cause may be natural or artificial; e.g., solution, erosion, earthquakes, volcanism, or compaction or withdrawal of solids or fluids from the subsurface.

SUBSOILING--The loosening of soil to depths greater than 16 inches (see also 'CHISELING.'

SUBSTRATUM MATERIALS--Earthen or rock materials which are below the zone of soil formation.

SWALE--A depression which is often wet.

TECTONIC--Relating to the study of the regional deformation of the earth's crust and the formation of structures, their origin, mutual relations, and evolution. Closely related to structural geology, which generally deals with more local effects.

TERRACE DITCH--An earthen dam placed across the right-of-way, generally on gently sloping areas where the trench traverses directly up and/or down the face of a hill to break up the flow of water down the face of the hill and/or right-of-way. Sandbag ditch breakers in the trench prevent erosion.

THROUGHPUT--The amount of gas passed through a pipeline.

TOPSOIL--Surface soil, usually including the organic layer.

TRACTOR-DRAWN RIPPER--A large single tooth often mounted on a bulldozer used to fracture materials too hard for conventional earthmoving equipment to move.

UNDERSTORY--An underlying layer of low growing vegetation.

VISUAL RESOURCE MANAGEMENT (VRM)--The planning, design, and implementation of management objectives to provide acceptable levels of visual impacts for all resource management activities.

WEIRS--An obstruction placed across a stream to divert water.

WET DITCH METHOD--A form of pipeline construction used at stream crossings where the trench is not dewatered and ditching soil is piled upon the stream's banks. This soil is later reused for backfill.

WORKING INTEREST--Portion of oil or gas production proceeds from which operating and development costs are paid.

# Abbreviations and Acronyms

A.C. -- alternating current

ANGTS -- Alaska Natural Gas Transportation System

AQCR -- air quality control region

AUM -- animal unit month (see glossary)

BACT -- best available control technology

BIA -- Bureau of Indian Affairs

BLM -- Bureau of Land Management

B.P. -- before present

ca -- circa

CEC -- California Energy Commission

CFR -- Code of Federal Regulations

CIG -- Colorado Interstate Gas Company

circa -- about

Cities -- Cities Service Gas Company

CO -- carbon monoxide

COE -- U.S. Army Corps of Engineers

CPUC -- California Public Utilities Commission

CUP -- Central Utah Project

db(A) -- decibels on the A-weighted scale

DEIS -- draft environmental impact statement

$D_{50}$ -- particle diameter corresponding to percent finer by dry weight on a graduation curve

DOI -- U.S. Department of the Interior

DOT -- U.S. Department of Transportation

EA -- Environmental Assessment

El Paso -- El Paso Natural Gas Company

EPA -- U.S. Environmental Protection Agency

FAA -- Federal Aviation Administration

FCC -- Federal Communications Commission

FEIS -- final environmental impact statement

FERC -- Federal Energy Regulatory Commission

FLPMA -- Federal Land Policy and Management Act

FS -- U.S. Forest Service

FWS -- U.S. Fish and Wildlife Service

g -- gravity acceleration

HC -- hydrocarbons (nonmethane)

HCRS -- Heritage Conservation and Recreation Service

hp -- horsepower

HQ -- headquarters

HVDC -- high voltage direct current

IPP -- Intermountain Power Project

KGRA -- known geothermal resource area

kV -- kilovolts

$L_{dn}$ -- day-night sound levels

$L_{eq}$ -- sound energy averaged over 24 hours

LNG -- liquefied natural gas

Mbf -- thousand board feet

Mcfd -- thousand cubic feet per day

MFP -- Management Framework Plan

mg -- milligrams

MMI -- Modified Mercalli Intensity

MOA -- Memorandum of Agreement

Mountain Fuel -- Mountain Fuel Supply Company

MP -- milepost

MW -- megawatt

N.A. -- not applicable

NAAQS -- national ambient air quality standards

NEPA -- National Environmental Policy Act

NGC -- Natural Gas Company of California

Northwest -- Northwest Pipeline Corporation

$NO_x$ -- nitrogen oxides

$NO_2$ -- nitrogen dioxide

NPDES -- national pollutant discharge elimination system

NPS -- National Park Service

ORV -- off-road vehicle

PG&E -- Pacific Gas and Electric Company

PGT -- Pacific Gas Transmission Company

PIT -- Pacific Interstate Transmission Company

PLS -- Pacific Lighting Service Company

PSD -- prevention of significant deterioration

psig -- the magnitude of pressure above atmospheric pressure (14.7 pounds per square inch absolute)

PTMAX -- EPA's users network for applied modeling of air pollution point source model

PTS -- Pacific Transmission Supply Company

# ABBREVIATIONS AND ACRONYMS

RARE II -- Second Roadless Area Review and Evaluation

ROW -- right-of-way

RMPC -- Rocky Mountain Pipeline Company

RMPP -- Rocky Mountain Pipeline Project

SHPO -- State Historic Preservation Office

SoCal -- Southern California Gas Company

Southwest -- Southwest Gas Corporation

$SO_x$ -- sulfur oxides

$SO_2$ -- sulfur dioxide

Trans-Anadarko -- Trans-Anadarko Pipeline System

TSP -- total suspended particulates

TUP -- temporary use permit

UBC -- Uniform Building Code

ug -- microgram

UNAMAP -- Users Network for Applied Modeling of Air Pollution; a computer package consisting of six air quality simulation models

UNK -- unknown

USAF -- U.S. Air Force

USC -- United States Code

USGS -- U.S. Geological Survey

VHF -- very high frequency

VMS -- Visual Management System

VQO -- Visual Quality Objective

VRM -- Visual Resource Management

WINGS -- Wyoming Interstate Natural Gas System

WPRS -- Water and Power Resources Service

WSA -- Wilderness Study Area

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# Appendix A
# Consultation and Coordination

The key agencies involved in preparing the EIS evaluated the scope of the EIS after reviewing the data received from the 11 scoping meetings and letters received by BLM which identified specific issues of concern.

The following agencies, groups, institutions, and individuals will receive a copy of the DEIS:

### FEDERAL GOVERNMENT AGENCIES

Department of the Interior

- Office of the Secretary
- Denver Office of the Secretary
- Bureau of Land Management
- Bureau of Indian Affairs
- Fish and Wildlife Service
- Geological Survey
- Water and Power Resources Service
- National Park Service
- Bureau of Mines

**Department of Agriculture**

- U.S. Forest Service

**Department of Defense**

- U.S. Army Corps of Engineers
- Air Force

**Department of Transportation**

- Federal Highway Administration

**Department of Energy**

**Environmental Protection Agency, Region 8**

**Advisory Council on Historic Preservation**

**Interstate Commerce Commission**

### STATE GOVERNMENTS AND AGENCIES

(Detailed list available upon request from Janis L. Bowles, BLM EIS Project Leader, 555 Zang Street, Third Floor East, Denver, Colorado 80228, phone (303) 234-6737 or Kenneth D. Frye, FERC Project Manager, 825 North Capitol Street NE, Washington, D.C. 20426, phone (202) 357-9039.)

| | |
|---|---|
| California | A-95 Clearinghouse |
| | State liaison contact |
| Idaho | A-95 Clearinghouse |
| | State liaison contact |
| Nevada | A-95 Clearinghouse |
| | State liaison contact |
| Oregon | A-95 Clearinghouse |
| | State liaison contact |
| Utah | A-95 Clearinghouse |
| | State liaison contact |
| Wyoming | A-95 Clearinghouse |
| | State liaison contact |

# APPENDIX A--CONSULTATION AND COORDINATION

## LOCAL GOVERNMENTS

(Detailed list available upon request from Janis L. Bowles or Kenneth D. Frye.)

Various commissioners, mayors, and departments

## U.S. SENATORS AND REPRESENTATIVES

(Detailed list available upon request from Janis L. Bowles or Kenneth D. Frye.)

California

Idaho

Nevada

Oregon

Utah

Wyoming

## STATE LEGISLATORS

(Detailed list available upon request from Janis L. Bowles or Kenneth D. Frye.)

California

Idaho

Nevada

Oregon

Utah

Wyoming

# ENVIRONMENTAL GROUPS

Audubon Society

Friends of the Earth

Natural Resources Defense Council

National Wildlife Federation

Sierra Club

Wilderness Society

Izaak Walton League of America

## CITIZENS' GROUPS

League of Women Voters

## INDUSTRIES

Pacific Gas Transmission Company

Pacific Gas and Electric Company

El Paso Natural Gas Company

Northwest Pipeline Company

Intermountain Power Project

$CH_2$ M Hill

TRW, Inc.

## FERC SERVICE LIST

## LIBRARIES

(Detailed list available upon request from Janis L. Bowles or Kenneth D. Frye.)

Depositories, libraries, cities, and counties along the RMPP.

## INDIVIDUALS

Copies may be inspected at the following offices:

## BUREAU OF LAND MANAGEMENT

Office of Special Projects, Washington, D.C.

Office of Special Projects, Denver, CO

California State Office, Sacramento, CA

Bakersfield District Office, Bakersfield, CA

California Desert District, Riverside, CA

Folsom District Office, Folsom, CA

Idaho State Office, Boise, ID

Burley District Office, Burley, ID

Idaho Falls District Office, Idaho, ID

Nevada State Office, Reno, NV

Battle Mountain District Office, Battle Mountain, NV

Ely District Office, Ely, NV

Las Vegas District Office, Las Vegas, NV

Oregon State Office, Portland, OR

Baker District Office, Baker, OR

Burns District Office, Burns, OR

Prineville District Office, Prineville, OR

Utah State Office, Salt Lake City, UT

# APPENDIX A--CONSULTATION AND COORDINATION

Salt Lake City District Office, Salt Lake City, UT

Cedar City District Office, Cedar City, Ut

Richfield District Office, Richfield UT

**FEDERAL ENERGY REGULATORY COMMISSION**

Division of Public Information
825 North Capitol Street NE
Washington, D.C 20426

San Francisco Regional Office
555 Battery Street
San Francisco, CA 94111

# Appendix B

# RMPC Corporate Structure and National Gas Supply


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Annual Production, Reserves, and Consumption of Natural Gas in the United States ..... B-4

# APPENDIX B--RMPC CORPORATE STRUCTURE

## RMPC OWNERSHIP AND CORPORATE STRUCTURE OF THE PROJECT SPONSORS

The RMPC is composed of the following four companies: PGT, El Paso, PIT, and NPC. The flow diagram, figure B-I, depicts the relationships between these four companies, their affiliates, and their subsidiaries.

The outline that follows lists the acronyms used in the flow diagram. Each major heading denotes a parent company. Each subheading denotes a subsidiary of the parent company related in some way to the RMPP. Each section describes that company's relationship to the RMPP.

## El Paso Natural Gas Company (El Paso )

El Paso is a partner in the RMPC, owning 30 percent of the company. It is one of four natural gas companies that would receive gas as a result of the RMPP. Gas would be delivered to El Paso by displacement.

## Northwest Energy Company (NEC)

NEC owns Northwest Pipeline Corporation, which is a partner in RMPC. NEC would not receive gas from the proposed RMPP.

### NORTHWEST ALASKAN PIPELINE COMPANY (NAPC)

NAPC is one of 11 partners of the Alaska Northwest Natural Gas Transportation Company, which will construct the Alaskan natural gas pipeline.

### NORTHWEST PIPELINE CORPORATION (NPC)

NPC is one of four partners in the RMPC, owning 10 percent of the company. NPC could transport some gas from the Rocky Mountain Overthrust Belt region to California markets using its existing transmission system.

## Pacific Lighting Service Company (PLS)

PLS is one of four natural gas companies that would receive gas from the proposed RMPP. PLS and PG&E would jointly own the 36-inch diameter 27-mile long proposed intrastate pipeline in southern California. PLS, PG&E, and SoCal are also working together to obtain Alaskan gas supplies for consumption in California. PLS owns PIT.

### WESTERN LIQUEFIED NATURAL GAS (LNG) TERMINAL COMPANY (WESTERN)

Western and PG LNG are cosponsoring the Western Terminal Project, which would receive Alaskan and Indonesian natural gas as LNG.

### PACIFIC ALASKA LNG COMPANY (PA LNG)

PA LNG and Alaska California LNG Company (AC LNG) are cosponsoring the Pacific Alaska Project, which would liquefy Alaskan natural gas to be shipped to Western.

### PACIFIC LIGHTING MARINE COMPANY (PLMC)

PLMC and Pacific Gas Marine Company (PGMC) are affiliates which would jointly own and operate the LNG vessels transporting LNG from Alaska to California for PA LNG and Western. This affiliation is known as the Pacific Marine Associates (PMA).

### PACIFIC INTERSTATE TRANSMISSION COMPANY (PIT)

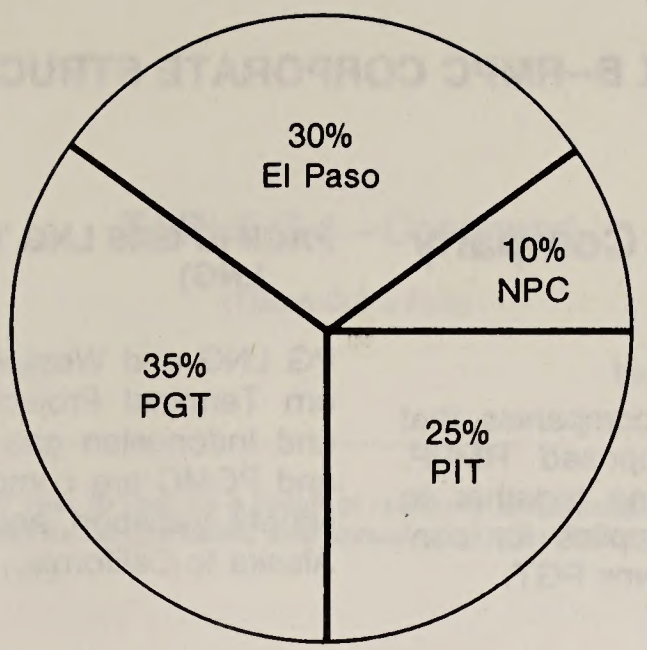
PIT is a partner in the RMPC, owning 25 percent of the company.

### SOUTHERN CALIFORNIA GAS COMPANY (SoCal)

SoCal is one of the four natural gas companies that would receive gas from the proposed RMPP. PLS, PG&E, and SoCal are working together to obtain Alaskan and Indonesian gas supplies for consumption in California.

### PACIFIC INTERSTATE COMPANY (ARCTIC) (PITA)

PITA is the partner in the Alaska Northwest Natural Gas Transportation Company, representing PLS.




Subsidiaries and Affiliates of El Paso, NPC, PIT, and PGT

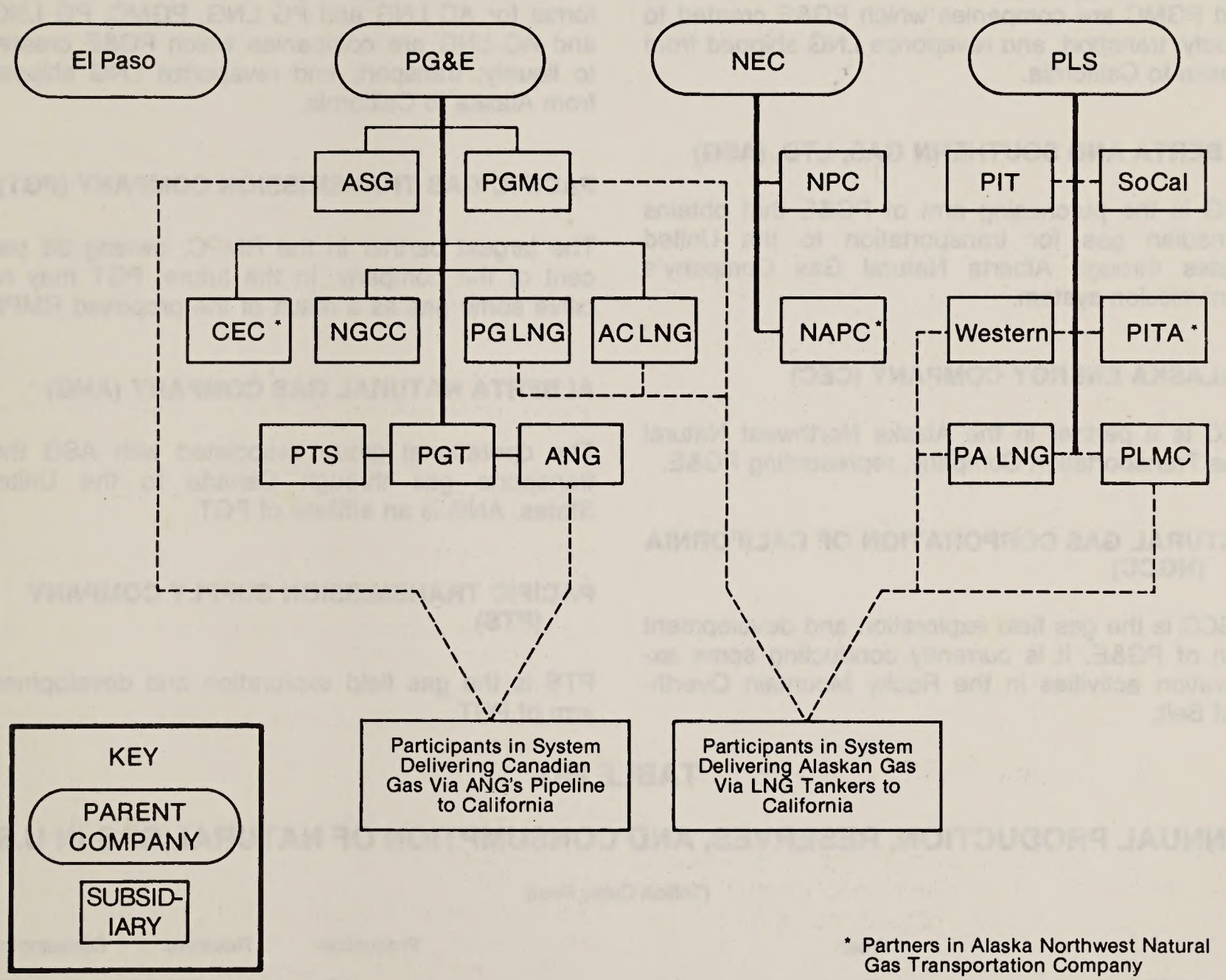



FIGURE B-1. RMPC OWNERSHIP AND CORPORATE STRUCTURE OF THE PROJECT SPONSORS

# APPENDIX B--RMPC CORPORATE STRUCTURE

## Pacific Gas And Electric Company (PG&E)

PG&E is one of four natural gas companies that would receive gas from the proposed RMPP. PG&E, SoCal, and PLS are working together to obtain Alaskan and Indonesian supplies for consumption in California. PG&E also owns PGT.

### ALASKA CALIFORNIA LNG COMPANY (AC LNG)

AC LNG and PA LNG are cosponsoring the Pacific Alaska Project that would liquefy Alaskan natural gas to be shipped to Western. AC LNG, PG LNG, and PGMC are companies which PG&E created to liquefy, transport, and revaporize LNG shipped from Alaska to California.

### ALBERTA AND SOUTHERN GAS, LTD. (ASG)

ASG is the purchasing arm of PG&E that obtains Canadian gas for transportation to the United States through Alberta Natural Gas Company's transmission system.

### CALASKA ENERGY COMPANY (CEC)

CEC is a partner in the Alaska Northwest Natural Gas Transportation Company, representing PG&E.

### NATURAL GAS CORPORATION OF CALIFORNIA (NGCC)

NGCC is the gas field exploration and development arm of PG&E. It is currently conducting some exploration activities in the Rocky Mountain Overthrust Belt.

### PACIFIC GAS LNG TERMINAL COMPANY (PG LNG)

PG LNG and Western are cosponsoring the Western Terminal Project that would receive Alaskan and Indonesian gas as LNG. PG LNG, AC LNG, and PGMC are companies which PG&E created to liquefy, transport, and revaporize LNG shipped from Alaska to California.

### PACIFIC GAS MARINE COMPANY (PGMC)

PGMC and PLMC are affiliates in Pacific Marine Associates. They would jointly own and operate the LNG vessels transporting LNG from Alaska to California for AC LNG and PG LNG. PGMC, PG LNG, and AC LNG are companies which PG&E created to liquefy, transport, and revaporize LNG shipped from Alaska to California.

### PACIFIC GAS TRANSMISSION COMPANY (PGT)

The largest partner in the RMPC, owning 35 percent of the company. In the future, PGT may receive some gas as a result of the proposed RMPP.

### ALBERTA NATURAL GAS COMPANY (ANG)

The operational group associated with ASG that transports gas through Canada to the United States. ANG is an affiliate of PGT.

### PACIFIC TRANSMISSION SUPPLY COMPANY (PTS)

PTS is the gas field exploration and development arm of PGT.

## TABLE B-1

## ANNUAL PRODUCTION, RESERVES, AND CONSUMPTION OF NATURAL GAS IN U.S.

(Trillion Cubic Feet)

| Year | Production | Reserves | Consumption |
|---|---|---|---|
| 1971 | 22.1 | 278.8 | 22.5 |
| 1972 | 22.5 | 266.1 | 22.7 |
| 1973 | 22.6 | 250.0 | 22.5 |
| 1974 | 21.3 | 237.1 | 21.3 |
| 1975 | 19.7 | 228.2 | 19.9 |
| 1976 | 19.5 | 216.0 | 20.2 |
| 1977 | 19.4 | 208.9 | 19.9 |
| 1978 | 19.3 | 200.3 | 19.8 |

## TABLE B-1—Continued

(Trillion Cubic Feet)

| Year | Production | Reserves | Consumption |
|---|---|---|---|
| 1979 | 19.9 | 194.9 | 19.9 |

Note: Annual reserve data vary from year to year as a result of revisions and extensions of previous reserve estimates, new gas field discoveries, new reservoir discoveries in old gas fields, and annual production from existing reserves.

Source: American Gas Association 1979.

# Appendix C

# Mitigation Measures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# APPENDIX C--MITIGATION MEASURES

This appendix identifies four groups of mitigation measures. The first two are part of the applicant's proposed action; the third would be in addition to the applicant's proposal; the last would be implemented depending on the alternatives or variations selected by the FERC, BLM and FS decision-makers. The impact analysis assumes incorporation into the project of first two groups proposed by RMPC, and the third, developed by the BLM and FS to be applied as one of the stipulations to the right-of-way grant. It does not assume incorporation of the fourth group. This group has been developed as a result of impact analysis and will be made part of the stipulations to the right-of- way grant.

The "BLM and FS General Measures" presented in appendix D are also routinely required of similar projects in this part of the country to mitigate impacts. The analysis assumes that these measures will be implemented.

## ADDITIONAL RMPC MITIGATIVE MEASURES

The following measures are proposed by the applicant. The impact analysis assumes these measures would be implemented.

To determine the actual construction right-of-way, the applicant would conduct air and limited ground reconnaissance surveys of the proposed corridor. In addition, specialized surveys focusing on hydrographic, topographic, geotechnical, seismic, archaeological, paleontological, and biological concerns would be conducted as necessary. The applicant is in the process of procuring a contract for a cultural resource inventory of the proposed and alternate pipeline routes. All survey results would be used to determine the final pipeline alignment and design and to identify specific topics of concern.

The final right-of-way would be selected to limit contact with highly erodible slopes, woodlands, and wetlands and to preserve the local aesthetic values, particularly at stream and river crossings and through areas where the right-of-way would be highly visible. The final route selection would also incorporate minor deviations prompted by environmental considerations, right- of-way easement acquisition, local terrain features, and land use patterns. If alignment changes could not be made, the applicant would undertake mitigation measures where practical.

The applicant would use the following mitigative measures during construction of the proposed pipeline. (Other mitigative measures are discussed under 'Construction, Operation, and Maintenance' in chapter 2.)

- Concrete-lined canals, irrigation ditches, and drainage channels would normally be crossed by boring and casing.

- Because of potentially severe erosion, the applicant plans to bore the Las Vegas Wash crossing.

- If new access roads were required, they would be located to minimize sidehill cuts and to avoid drainage bottoms and areas of grass, water tanks, and riparian vegetation.

- Any new borrow pits would be located only in these areas authorized by landowners or responsible agencies.

- Where feasible, the applicant would feather the edges of the right-of-way vegetation to lessen the visual impact.

- To the extent possible, the applicant would avoid construction during peak wildlife breeding periods or other critical times.

- Dust would be controlled during construction by water sprinkling and controlling vehicle speed limits at work sites.

- Marketable timber cleared in national forests would be harvested and set aside as directed by the FS.

- To ensure contract compliance, the applicant would have inspectors at the construction site to see that contractors carried out all construction in accordance with Federal and state regulations and project stipulations.

- During construction in a biologically sensitive area, a qualified biologist would be present to assure that planned mitigation measures were carried out and to recommend additional measures as necessary. Mitigation measures would be based on the applicant's preconstruction biological field surveys and consultation with wildlife agencies concerning unique or sensitive communities or habitats of threatened or endangered species. Further, a qualified archaeologist and paleontologist would be available as needed.

- Water for hydrostatic testing would be obtained from approved sources and pumped in a manner that would minimize alteration of streamflow conditions, fish and wildlife resources, or aesthetic values of an area. To prevent damage to aquatic organisms, water intakes would be screened, and the rate of intake would be slow.

- If the hydrostatic test water were discharged into a dry waterway, the discharge rate would not exceed the reported flow during normal flow periods. If a watercourse were not available, the test water would be discharged to a temporary evaporation pond. The quality of the hydrostatic test water would be monitored before, during, and after discharge. All applicable Federal and state water quality regulations would be met at the time of discharge.

- The proposed Sage Compressor Station would be designed to blend with the natural landscape. Consideration would be given to landscaping, plantings, colors compatible with the local environment, and nonreflective paint.

# EROSION CONTROL, REVEGETATION, AND RESTORATION GUIDELINES PROPOSED BY THE RMPC

On January 23, 1981, the applicant filed the following 'Erosion Control, Revegetation, and Restoration Guidelines' with the FERC. This filing consolidates its statement of restoration procedures. Site-specific plans would have to be developed after the exact alignment of the pipeline had been determined.

Standard procedures for the Rocky Mountain Pipeline Project (RMPP) would include implementation of erosion control and revegetation measures to assure that lands disturbed by construction activities would be restored to a stable, productive, and aesthetically acceptable condition, similar to preconstruction conditions.

Because the proposed right-of-way is composed of many types of terrain, soils, vegetation, land uses, and climatic conditions, detailed site-specific reclamation plans would be developed prior to construction and would include sets of techniques and measures tailored to each condition encountered. Local expertise and locally effective reclamation methods would be considered when the site-specific procedures for the detailed reclamation plan are developed.

The rights and obligations of the RMPP applying to its use of private lands will be set out in the terms of the easement, an agreement between the RMPP and the landowner. Terms of the easement will include: the width and location of the right-of-way; the granting of permission to construct, replace, maintain, use, and remove facilities as described; the granting of right of ingress and egress to the facilities; the right to mark the facility; the obligation of the landowner to maintain cover over the buried facilities; some minimal restrictions placed on the use of the right-of-way by the landowner; and the restoration or mitigation measures that are to be performed by the RMPP to satisfy the requirements of the landowner. During the construction phase of the project, the applicant's representative would provide: (1) liaison with private landowners, Federal agency officials, and local governments; (2) expertise to direct applicable restoration procedures, where special conditions are encountered, without causing construction delays; and (3) favorable public relations.

General erosion control and restoration measures have been developed for the following areas:

- Right-of-way and Site Clearing
- Trenching and Preservation of Topsoil
- Backfilling and Grading
- Land Preparation and Cultivation
- Revegetation
- Maintenance and Monitoring
- Use of Biochemicals
- Construction Timing

## Right-of-way and Site Clearing

Emphasis would be placed on protecting existing vegetation and minimizing disturbance of the existing environment.

o Land grading would be done only where necessary to accommodate construction equipment.

o Sidehill cuts will be bladed only enough to ensure a safe and stable plane for equipment usage.

o Vegetation will be cut close to the ground, with root systems left in place. The cut vegetation, including unmarketable timber would be stockpiled and later burned or shredded and chipped for use in restoration operations or disposed at the discretion of the landowner or authorized agency official.

o Where the right-of-way crosses streams and other water bodies, construction techniques designed to minimize siltation and turbidity will be used.

o Operation will be conducted in a manner to minimize the induction of debris into any body of water.

o Design and construction of temporary roads would ensure proper drainage and minimize soil erosion. Following use, these roads would be removed and areas restored as required by agreements with the landowners. Restoration would be to the satisfaction of the landowner.

o Time interval between clearing operations and actual construction activities would be minimized.

## Trenching and Preservation of Topsoil

Trenching methods and techniques would ensure that:

When requested by landowners in agricultural areas, topsoil will be conserved and protected against possible loss. Upon completion of backfilling, the topsoil will be properly replaced over the graded or excavated areas. A 'double ditching' procedure will be used where such method will benefit the preservation of topsoil.

o Excavated materials will be stored in a strip approximately 25-feet wide along one side of the right-of-way. The remaining right-of-way will be used to provide access for construction equipment, to permit passage of equipment, to store supplies, and to construct the pipeline.

o Cofferdams or other diversionary techniques would be used where necessary to permit flow in one part of a stream while pipelaying construction occurs in another part.

## Backfilling and Grading

The following backfilling and grading techniques would be used:

o The contour of the ground would be restored to permit normal surface drainage, a slight berm will be left over the pipeline which will compensate for natural subsidence of backfill.

o In sloping terrain, erosion control structures such as water bars, diversion channels, and terraces would be constructed to divert water away from the pipeline trench and reduce soil erosion along the right-of-way or other areas disturbed by the construction.

o All structures such as terraces, levees, underground drainage systems, irrigation pipelines, and canals would be restored to preconstruction conditions so that they would function as originally intended.

o The surface would be graded to conform to the existing surface of the adjoining areas except for a slight crown to compensate for natural subsidence. In cropland areas, especially border- and furrow-irrigated cropland, the backfill will be jetted to compact soil to its natural density and to match the bordering areas to allow surface irrigation.

o Materials unsuitable for backfilling or excess fill material would be disposed in a waste area arranged by the project representative with the landowner or authorizing officials.

o Temporary work space areas used at stream and highway crossings and other special sites would be restored to approximately preconstruction condition to the satisfaction of landowner or authorizing officials.

o The right-of-way at stream crossings would be restored to a preconstruction state. The upland areas and banks would be revegetated to simulate preconstruction conditions. Where revegetation is not possible, the banks would be protected with rock. The streambed would be returned to its original elevation and grade.

## Land Preparation for Seeding and Cultivation

Construction, backfilling, and grading activities commonly cause compaction and alter soil conditions that may affect soil productivity and/or seeding success in the right-of-way areas. The following practices and techniques would be used to improve these soil conditions, protect soil from erosion, and provide a favorable seedbed:

o In accordance with agreements with the landowner, cultivated land that has been compacted during construction will be loosened by use of a ripper, disc or harrow or other suitable equipment. Land structures, such as contour terraces, drain ways and ditches will be rebuilt.

o Where the right-of-way will be subject to strong erosional forces prior to vegetation reestablishment, straw will be mulched into the soil to promote physical stabilization. Snow fences will be constructed where appropriate to prevent further erosion.

o In addition to installing erosion-control structures, erosion-prone areas will be reseeded, using supplemental fertilizers as necessary.

o When needed, excess ditch spoil or rock may be used for erosion-control.

o Soil areas with rock fragments, such as very coarse gravel, cobble, or stone scattered on the surface, would be restored to simulate the original preconstruction surface condition and to blend with the adjoining area.

## Revegetation (Reseeding and Planting)

The loss of vegetation from lands disturbed by pipeline construction can be mitigated by satisfactory revegetation. To ensure a successful revegetation program, methods and procedures would be consistent with local climate and soil conditions and would consider recommendations of local experts. The following practices and techniques would be used in areas where reseeding is suitable:

o A firm seedbed would be prepared prior to seeding. This may include a mulch of plant residues or other suitable materials. A cover crop may be needed in larger disturbed areas.

o Seed would be planted by drilling, broadcasting, or hydroseeding.

- Drill seeding with a grass drill equipped with depth bands would be used where topography and soil conditions allow operation of equipment.
- Broadcast seeding would be used for inaccessible or small areas. Seed would be covered by raking or harrowing.
- Hydroseeding would be done in critical areas, as determined by agency representative and the applicant.

o Only species adapted to local soil and climatic conditions would be used. Generally, these would be native species; however, introduced species may be considered for specific conditions when approved by the landowner and regulatory authority. Seeding rates in critical area plantings and generally throughout the right-of-way will be determined to allow for seed mortality due to adverse growing conditions.

o Seeding would be scheduled based on the assessment of local climatic conditions and the response of newly seeded grasses to such conditions.

## Maintenance and Monitoring

The right-of-way would be inspected to monitor the success and maintenance of erosion control measures and revegetation programs on native grazing lands. The monitoring program would identify problem areas and corrective measures to ensure vegetation cover and erosion control. Certification of successful revegetation and erosion control would be based on compliance with right-of-way agreements.

## Use of Biochemicals

Herbicides, or any other biochemicals, if required, will be those commercially available, approved by EPA, appropriate to be used for the situation at hand, and applied in full compliance with the manufacturer's instructions.

## Construction Timing

Irrigated Cropland--Pipeline construction activities would be scheduled or other mitigative measures taken to minimize disruption of irrigation delivery systems during the major irrigation season, to reduce effects on crop production in areas of construction as well as adjoining irrigated cropland areas served by the systems.

# EROSION CONTROL, REVEGETATION AND RESTORATION GUIDELINES FOR USE ON FEDERAL LANDS

The following guidelines, developed by the BLM and FS, would be included as stipulations in the rights-of-way grant issued to the RMPC.

Standard procedures for the Rocky Mountain Pipeline Project would include implementation of erosion control and revegetation measures to assure that lands disturbed by construction activities would be restored to a stable, productive, and aesthetically acceptable condition.

A detailed, site-specific reclamation plan would be developed and become part of the operation plan. Because the proposed right-of-way is composed of

many types of terrain, soils, vegetation, land uses, and climatic conditions, the detailed plan would include sets of techniques and measures tailored to each condition encountered. Local expertise and locally effective reclamation methods would be followed when the site-specific procedures for the detailed reclamation plan are developed. The erosion control, revegetation, and restoration guidelines and plan would be implemented under the direction of the appropriate agency official.

Detailed information regarding applicable techniques and technical assistance to private landowners concerning erosion control measures and reclamation procedures would be obtained from the Soil Conservation Service through local Soil Conservation Districts. Technical assistance and approval of written plans for Federal lands would be obtained from the Bureau of Land Management and the U.S. Forest Service prior to any construction.

During construction of the project, an on-site reclamation specialist would be employed by the applicant to provide: (1) liaison with private landowners, Federal agency officials, and local governments; (2) expertise to direct applicable restoration procedures when special conditions are encountered, without causing construction delays; and (3) favorable public relations.

General erosion control and restoration measures have been developed for the following areas and will be included as part of the Operating Plan:

- Right-of-way and Site Clearing
- Trenching and Preservation of Topsoil
- Backfilling and Grading
- Land Preparation and Cultivation
- Revegetation
- Maintenance and Monitoring
- Use of Biochemicals

## Right-of-way and Site Clearing

Emphasis would be placed on protecting existing vegetation and minimizing disturbance of the existing environment.

o Land grading would be done only on the area required for construction.

o Sidehill cuts would be kept to a minimum to ensure resource protection and a safe and stable plane for efficient equipment use. The authorizing agency would provide assistance and would approve sidehill cuts prior to construction.

o Existing ground cover such as grasses, leaves, roots, brush, and tree trimmings would be cleared only to the extent necessary, stockpiled and conserved. Tree limbs and trees not usable or merchantable would be stockpiled and later shredded and chipped for use in restoration operations or disposed of at the discretion of the authorized agency official.

o Trees and shrubs on the right-of-way that are not cleared would be protected from damage during construction.

o Where the right-of-way crosses streams and other water bodies, the banks would be stabilized to prevent erosion. Construction techniques would minimize damage to shorelines, recreational areas, and fish and wildlife habitat.

o Care would be taken to avoid oil spills and other types of pollution in all areas including streams and other water bodies and in their immediate drainage areas. All spills would be immediately cleaned up.

o Design and construction of all temporary roads would be based on an approved transportation plan and would ensure proper drainage, minimize soil erosion, and preserve topsoil. After abandonment these roads would be closed and areas restored without undue delay or maintained at the discretion of landowners. Restoration, including redistribution of topsoil, would be to the satisfaction of landowner and/or regulatory officials.

o During adverse weather conditions, as determined by the onsite reclamation specialist, the authorizing agency would issue stop and start orders to prevent rutting or excessive tracking of soil and deterioration of vegetation in the right-of-way area.

o During construction activities near streams or lakes, sedimentation (detention) basins and/or straw bale filters would be constructed to prevent suspended sediments from reaching downstream watercourses or lakes.

o Actual construction activities will immediately follow clearing operations, especially in areas of soil that are highly susceptible to wind or water erosion and other special areas.

## Trenching and Preservation of Topsoil

Trenching methods and techniques would ensure that:

o Topsoil is removed from the trench area by double-ditching (i.e., windrowed separately, protected, and replaced last during backfilling). This procedure would be followed as specified by the authorizing officer.

o Remaining unearthed materials are removed and stored in a manner that facilitates backfilling procedures, uses a minimum amount of right-of-way area, and protects the excavated material from vehicular and equipment traffic.

o Cofferdams or other diversionary techniques would be used where necessary to permit flow in one part of a stream while pipelaying construction occurs in another part.

o A specific trenching and excavated material stockpiling procedure would be used on steep-sloping and rough, broken terrain to ensure minimum disturbance as outlined in the operations plan.

## Backfilling and Grading

The following backfilling and grading techniques would be used:

o Backfill would be replaced in a sequence and density similar to the preconstruction soil condition.

o Backfilling operations would be conducted in such a manner to minimize further disturbance of vegetation.

o The contour of the ground would be restored to permit normal surface drainage.

o In strongly sloping and steep terrain, erosion control structures such as water bars, diversion channels, and terraces would be constructed to divert water away from the pipeline trench and reduce soil erosion along the right-of- way and other adjoining areas disturbed during construction.

o All structures such as terraces, levees, underground drainage systems, irrigation pipelines, and canals would be restored to preconstruction conditions so that they would function as orginally intended.

o The surface would be graded to contorm to the existing surface of the adjoining areas except for a slight crown over the trench to compensate for natural subsidence. In cropland areas, especially border and furrow irrigated cropland, the soils would be compacted and the crown would be smoothed to match the bordering area to allow surface irrigation.

o Topsoil would be uniformly replaced over the trench fill and other disturbed areas to restore productivity to its preconstruction condition.

o Materials unsuitable for backfilling or excess backfill material would be disposed as arranged by the authorizing officials.

o Temporary work space areas used at stream and highway crossings and other special sites would be restored to approximate preconstruction conditions and to the satisfaction of authorizing officials.

o The right-of-way at stream crossings would be restored to a preconstruction state. The upland areas and banks would be revegetated to preconstruction conditions. Where this is not possible, they would be mulched with rock. The size of the rock mulch would be larger in diameter than materials excavated from the trench. The streambed would be returned to its original contours with sediments like those that were excavated.

## Land Preparation for Seeding and Cultivation

Construction, backfilling, and grading activities commonly cause compaction and alter soil conditions that affect soil productivity and/or seeding success in the right-of-way area. The following practices and techniques would be used to improve these soil conditions, protect soil from erosion, and provide a favorable seedbed:

o In cropland areas, unless objected to by the landowner, subsoiling or chiseling would be used to ensure that soil compaction is reduced and preconstruction soil permeability is restored.

o Chiseling would be used, unless objected to by the landowner or authorizing agency, in range land areas to reduce compaction and improve soil permeability. Pitting and contour furrowing as directed by the authorizing agency or landowner would be done on steeper slopes of disturbed areas to increase infiltration and to reduce runoff and erosion in areas where precipitation is favorable.

o Suitable mulches and other soil stabilizing practices would be used on all regraded and topsoiled areas to protect unvegetated soil from wind and water erosion and to improve water absorption.

o Special mulching practices or matting would be necessary in critical areas where wind and water are serious erosion hazards to protect seeding, seedlings after germination, and plantings.

o Commercial fertilizers would be applied to soil areas with low inherent fertility to maintain crop yields and establish grass seedings. Application rates would be commensurate with annual precipitation and available irrigation water.

o Seedbed for areas seeded to grass would be prepared to provide a firm and friable condition suitable for the establishment of grass stands.

o Rock mulches would be used in steep-sloping rock outcrop areas and low precipitation areas to reduce erosion and promote vegetal growth.

o Cultivation and land preparation operations on steeply sloping areas would be done on the contour to minimize erosion.

o Soil areas with rock fragments, such as very coarse gravel, cobble, or stone scattered on the surface, would be restored to the original preconstruction surface condition to blend with the adjoining area, to avoid a smooth surface right-of-way area, and to control accelerated erosion.

## Revegetation (Reseeding and Planting)

The loss of vegetation from lands disturbed by pipeline construction can be mitigated only by satisfactory revegetation. To ensure a successful revegetation program, methods and procedures would be consistent with local climate and soil conditions and would follow recommendations and directions of local experts. Revegetation efforts would be continued until a satisfactory vegetative cover is established. The following practices and techniques would be used in areas where reseeding is suitable as determined by the authorizing agency:

o A firm seedbed would be prepared prior to seeding. This would include a mulch of plant residues or other suitable materials. A cover crop may be needed in larger disturbed areas.

o Seed would be planted by drilling, broadcasting, or hydroseeding. Drilling is the preferred method, because it is usually most successful.
- Drill seeding with a grass drill equipped with depth bands would be used where topography and soil conditions allow operation of equipment to meet the seeding requirements of the species being planted.
- Broadcast seeding would be used for inaccessible or small areas. Seed would be covered by raking or harrowing.
- Hydroseeding would be done in critical areas.

o Only species adapted to local soil and climatic conditions would be used. Generally, these would be native species. However, introduced species may be considered for specific conditions when approved by the landowner and regulatory authority. Seeding rates in critical area plantings and generally throughout the right-of-way would be increased 100 percent over regular seeding rates to allow for seed mortality due to adverse growing conditions.

o Seed testing will be conducted to meet state, Federal and agency seed requirements.

o Seeding would be done when seasonal or weather conditions are most favorable, and as determined by the landowner or authorized official.

o Grazing or mowing would be delayed at least one season after seeding to provide time for vegetation to become established, especially in highly erodible areas, unless objected to by the landowner or lessee. Protective fencing may be necessary in special areas and will be constructed, maintained and removed according to authorizing agency specifications.

o In areas of low annual precipitation, where reseeding is not suitable or as successful, erosion control structures and measures would be applied on sloping areas to reduce accelerated erosion, to allow reestablishment of preconstruction surface soil conditions, and to allow natural revegetation.

o Trees and shrubs would be reestablished in areas as specified in the revegetation plan.

## Maintenance and Monitoring

Joint inspection of the right-of-way by the applicant and authorizing agency would be conducted to monitor the success and maintenance of erosion control measures and revegetation programs on native grazing lands for two growing seasons, or for a period determined by the landowner on private land, or the authorized agency official on state or Federal land. The monitoring program would identify problem areas and corrective measures to ensure vegetation cover and erosion control. Certifi-

cation of successful revegetation and erosion control would be determined by the landowner or authorized agency official.

## Use of Biochemicals

The use of biochemicals such as herbicides, fungicides, and fertilizers would comply with state and Federal laws, regulations and policy regarding the use of poisonous, hazardous, or persistent substances. State and Federal wildlife agencies would be contacted if application of any of these substances would be on or near sensitive wildlife areas. Application of these substances would be by ground methods. Prior to the use of such substances on or near the permit or grant area, the applicant would obtain approval of a written plan for such use from the authorizing officer, landowner, and appropriate wildlife agency. The plan would outline the kind of chemical, methods of application, purpose of application, and other information as required, and would be considered as the authorized procedure for all applications until revoked by the authorizing officer, landowner, or appropriate wildlife agency. This plan will become part of the operation and construction plan.

## Construction Timing

Irrigated Cropland--Pipeline construction activities would be timed, as possible, to avoid disruption of irrigation delivery systems during the major irrigation season, to reduce effects on crop production in areas of construction as well as adjoining irrigated cropland areas served by the systems.

# MITIGATING MEASURES RESULTING FROM IMPACT ASSESSMENT

The following mitigation measures would be imposed on the Federal lands which the RMPP would traverse.

## General

**MEASURE:** The permanent right-of-way and the construction area covered by the temporary use permit will be no wider than 100 feet, per the application by the RMPC. The RMPC will employ two-toning or other methods necessary to stay within the 100-foot width. If additional width is necessary even with such construction methods, the Authorized Officer will prepare a supplementary environmental analysis (EA). The EA will be given high priority by the agency and will be prepared prior to surface disturbance outside of the 100-foot wide right-of-way. Mitigation developed in the EA will be applied as deemed necessary by the Authorized Officer in addition to the existing stipulations in the right-of-way grant and/or referenced construction-operating plan.

**EFFECTIVENESS:** The measure will help to ensure that excessive environmental disturbance would not occur. If additional construction width is necessary, the preparation of the site specific EA will allow the Authorized Officer to administer the project with adequate knowledge of the environmental consequences.

**APPLICATION:** The measure will be applied to the proposed action or to any of the alternatives and variations selected.

**MEASURE:** The Authorized Officer will work with the RMPC to locate and flag the 'feathered' vegetation edges to be kept clear of 2-inch diameter breast height shrubs or trees for visual safety inspection over the pipeline.

**EFFECTIVENESS:** In areas of a continuous pattern of vegetation the contrast would be significantly lessened by feathering straight-line clearings (over-clearing in some locations and clearing less than the granted right-of-way width in other areas to simulate natural vegetative patterns).

**APPLICATION:** This measure will be applied to the proposed action and to any alternative or variation which is selected and will provide for visual mitigation and safety inspection by foot, horseback, vehicle, or airplane.

## Vegetation

**MEASURE:** The larger species of cacti encountered through the desert areas will be stockpiled and replanted after right-of-way recontouring. Milepost areas and species requiring this procedure will be designated by the Authorized Officer. Where

transplanting is impractical, BLM will offer the cacti for sale or giveaway or will authorize the RMPC to do so.

**EFFECTIVENESS:** Cacti species must sit with no root protection to develop a 'callus' before they are replanted; thus, this method would be horticulturally successful in preserving the plants.

**APPLICATION:** The measure will be applied to the proposed action and to any alternatives and variations selected which would traverse creosote bush, saltbush-greasewood, or other vegetation types which contain cacti species.

**MEASURE:** The proposed route will be aligned to avoid affecting a unique stand of Rocky Mountain red cedar (Juniperus scopulorum), from MP 162 to MP 165.

**EFFECTIVENESS:** This action would be successful in eliminating significant effects on the tree stand.

**APPLICATION:** This measure will be applied to the proposed action or to the alternatives.

## Wildlife

Impacts to wildlife species and their habitats were assessed using the proposed construction schedule and a 1-mile wide corridor. Certain wildlife species would be adversely affected if pipeline construction took place in their habitats during critical periods in their life cycles. The proposed construction schedule would avoid many of these critical periods; thus, impacts are not anticipated. Other critical periods for wildlife coincide with the construction schedule. All critical habitats and use periods are listed on tables C-1 through C-8 for the proposed action, alternatives, and variations. Alignment of the pipeline could eliminate some of the areas; it could also add critical areas to the list.

**MEASURE:** The critical wildlife habitats and periods listed in table C-1 will be avoided during construction of the proposed action, unless direction is otherwise given from the authorized officer.

**EFFECTIVENESS:** Avoiding the areas listed in tables C-1 through C-7 would eliminate potential impacts to wildlife habitats and species of concern, including those which would be affected if the proposed construction schedule changes for any reason.

**APPLICATION:** The measure will be applied to the proposed action or any alternative and variation which is selected, as indicated by the following list:

Table C-1--Proposed Action

Table C-2--Alternative A, Northern Systems Alternative

Table C-3--Alternative B, Sanpete Valley Alternative

Table C-4--Alternative C, Central Nevada Alternative

Table C-5--Alternative D, Sevier-Escalante Desert Alternative

Table C-6--Alternative E, West Salt Lake Alternative

Table C-7--Alternative F, Provo Canyon Alternative

Table C-8--All variations

TABLE C-1

Crucial Wildlife Use Areas and Periods to be Avoided Along the Proposed Route

| Approximate MP | Dates When Construction Would be Avoided | Reason |
|---|---|---|
| 0-43 | November 15 to April 1 | Big Game Winter Range |
| 4-9 | March 1 to June 30 | Sage Grouse Habitat |
| 5-26 | March 15 to June 15 | Waterfowl Area |
| 17-18 | March 1 to June 30 | Sage Grouse |
| 18 | March 15 to July 15 | [1]Raptor Habitat |
| 22-26 | March 1 to June 15 | Sage Grouse Habitat |
| 27-29 | March 15 to July 15 | Raptor Habitat |
| 29 | March 15 to July 15 | Golden Eagle Nest |
| 30-41 | March 1 to June 30 | Sage Grouse Habitat |
| 36-39 | April 15 to July 15 | Waterfowl Area |
| 40 | March 15 to July 15 | Raptor Habitat |
| 49-52 | March 1 to June 30 | Sage Grouse Habitat |
| 49-52 | November 15 to April 1 | Big Game Winter Range |
| 68-92 | November 15 to April 1 | Big Game Winter Range |
| 129-158 | March 15 to July 15 | Raptor Habitat |
| 130-140 | April 15 to July 15 | Waterfowl Area |
| 134-139 | March 1 to June 30 | Sage Grouse Habitat |
| 152-163 | November 15 to April 1 | Big Game Winter Range |
| 155 | December 1 to March 31 | Bald Eagle Winter Habitat |
| 165 | March 15 to July 15 | Golden Eagle Nest |
| 165-168 | November 15 to April 1 | Big Game Winter Range |
| 165-169 | March 15 to July 15 | Raptor Habitat |
| 165-170 | November 15 to April 1 | Big Game Winter Range |
| 173-176 | March 1 to June 30 | Sage Grouse Habitat |
| 182-184 | November 15 to April 1 | Big Game Winter Range |
| 188-193 | November 15 to April 1 | Big Game Winter Range |
| 210-224 | November 15 to April 1 | Big Game Winter Range |
| 276-280 | November 15 to April 1 | Big Game Winter Range |
| 281-284 | March 1 to June 30 | Sage Grouse Habitat |
| 288-296 | November 15 to April 1 | Big Game Winter Range |
| 290-294 | March 1 to June 30 | Raptor Habitat |
| 307 | March 1 to June 30 | Golden Eagle Nest |
| 313 | March 1 to June 30 | Golden Eagle Nest |
| 356-358 | March 1 to June 30 | Raptor Habitat |
| 367-379 | November 15 to April 1 | Big Game Winter Range |
| 381-407 | November 15 to April 1 | Big Game Winter Range |

TABLE C-1—Continued

| Approximate MP | Dates When Construction Would be Avoided | Reason |
|---|---|---|
| 404-407 | March 1 to June 30 | Raptor Habitat |
| 435-445 | May 15 to September 15 | [2]Desert Bighorn Sheep Area |
| 440-447 | May 15 to September 15 | Quail Management Areas |
| 463 | May 15 to September 15 | Desert Bighorn Sheep |
| 477-488 | March 1 to June 30 | Golden Eagle Nesting Area |
| 485 | May 15 to September 15 | Desert Bighorn Sheep |
| 494 | May 15 to September 15 | Desert Bighorn Sheep |
| 509-515 | May 15 to September 15 | Desert Bighorn Sheep |
| 510-515 | March 1 to June 30 | Golden Eagle Nesting Area |
| 537 | May 15 to September 15 | Desert Bighorn Sheep |
| 539-541 | May 15 to September 15 | Quail Management Area |
| 548 | May 15 to September 15 | Desert Bighorn Sheep |
| 551-556 | May 15 to September 15 | Quail Management Area |
| 556-570 | May 15 to September 15 | Desert Bighorn Sheep |
| 560-578 | May 15 to September 15 | Quail Management Area |

[1]This period should be avoided only if pipeline construction would occur within 1 mile of an active raptor nest.

[2]This period should be avoided only if pipeline construction would occur within 2 miles of desert bighorn sheep habitat.

TABLE C-2

CRUCIAL WILDIIFE USE AREAS AND PERIODS TO BE AVOIDED ALONG THE NORTHERN SYSTEMS ALTERNATIVE (A)

| Approximate MP | Dates When Construction Would be Avoided | Reason |
|---|---|---|
| 0-10 | November 15 to April 1 | Big Game Winter Range |
| 0-8 | March 1 to June 30 | Sage Grouse Habitat |
| 18-24 | March 15 to June 15 | Waterfowl Area |
| 33-40 | November 15 to April 1 | Big Game Winter Range |
| 33-40 | March 1 to June 30 | [1]Raptor Habitat |
| 34 | March 1 to June 30 | Sage Grouse Habitat |
| 66-71 | November 15 to April 1 | Big Game Winter Range |
| 66-88 | March 1 to June 30 | Raptor Habitat |
| 142-167 | March 1 to June 30 | Raptor Habitat |
| 142-167 | March 15 to June 15 | Waterfowl Area |

[1]This period should be avoided only if pipeline construction would occur within 1 mile of an active raptor nest.

TABLE C-3

CRUCIAL WILDLIFE USE AREAS AND PERIODS TO BE AVOIDED ALONG THE SANPETE VALLEY ALTERNATIVE (B)

| Approximate MP | Dates When Construction Would be Avoided | Reason |
|---|---|---|
| | **Proposed Action MP** | |
| 0-43 | November 15 to April 1 | Big Game Winter Range |
| 4-9 | March 1 to June 30 | Sage Grouse habitat |
| 5-26 | March 15 to June 15 | Waterfowl Area |
| 17-18 | March 1 to June 30 | Sage Grouse |
| 18 | March 15 to July 15 | [1]Raptor Habitat |
| 22-26 | March 1 to June 15 | Sage Grouse Habitat |
| 27-29 | March 15 to July 15 | Raptor Habitat |
| 29 | March 15 to July 15 | Golden Eagle Nest |
| 30-41 | March 1 to June 30 | Sage Grouse Habitat |
| 36-39 | April 15 to July 15 | Waterfowl Area |
| 40 | March 15 to July 15 | Raptor Habitat |
| 49-52 | March 1 to June 30 | Sage Grouse Habitat |
| 49-52 | November 15 to April 1 | Big Game Winter Range |
| 68-92 | November 15 to April 1 | Big Game Winter Range |
| 129-158 | March 15 to July 15 | Raptor Habitat |
| 130-140 | April 15 to July 15 | Waterfowl Area |
| 134-139 | March 1 to June 30 | Sage Grouse Habitat |
| 152-163 | November 15 to April 1 | Big Game Winter Range |
| 155 | December 1 to March 31 | Bald Eagle Winter Habitat |
| 165 | March 15 to July 15 | Golden Eagle Nest |
| 165-168 | November 15 to April 1 | Big Game Winter Range |
| 165-169 | March 15 to July 15 | Raptor Habitat |
| 165-170 | November 15 to April 1 | Big Game Winter Range |
| 173-176 | March 1 to June 30 | Sage Grouse Habitat |
| | **Sanpete Valley MP** | |
| 0-18 | March 1 to June 30 | Sage Grouse Habitat |
| 75-154 | November 15 to April 1 | Big Game Winter Range |
| 135-139 | March 1 to June 30 | Sage Grouse Habitat |
| 144-148 | March 1 to June 3 | Sage Grouse Habitat |
| | **Proposed Action MP** | |
| 356-358 | March 1 to June 30 | Raptor Habitat |
| 367-379 | November 15 to April 1 | Big Game Winter Range |
| 381-407 | November 15 to April 1 | Big Game Winter Range |
| 404-407 | March 1 to June 30 | Raptor Habitat |
| 435-445 | May 15 to September 15 | [2]Desert Bighorn Sheep Area |
| 440-447 | May 15 to September 15 | Quail Management Areas |
| 463 | May 15 to September 15 | Desert Bighorn Sheep |

TABLE C-3—Continued

| Approximate MP | Dates When Construction Would be Avoided | Reason |
|---|---|---|
| 477-488 | March 1 to June 30 | Golden Eagle Nesting Area |
| 485 | May 15 to September 15 | Desert Bighorn Sheep |
| 494 | May 15 to September 15 | Desert Bighorn Sheep |
| 509-515 | May 15 to September 15 | Desert Bighorn Sheep |
| 510-515 | March 1 to June 30 | Golden Eagle Nesting Area |
| 537 | May 15 to September 15 | Desert Bighorn Sheep |
| 539-541 | May 15 to September 15 | Quail Management Area |
| 548 | May 15 to September 15 | Desert Bighorn Sheep |
| 551-556 | May 15 to September 15 | Quail Management Area |
| 556-570 | May 15 to September 15 | Desert Bighorn Sheep |
| 560-578 | May 15 to September 15 | Quail Management Area |

[1]This period should be avoided only if pipeline construction would occur within 1 mile of an active raptor nest.

[2]This period should be avoided only if pipeline construction would occur within 2 miles of a water source for desert bighorn sheep.

TABLE C-4

CRUCIAL WILDLIFE USE AREAS AND PERIODS TO BE AVOIDED ALONG THE CENTRAL NEVADA ALTERNATIVE (C)

| Approximate MP | Dates When Construction Would be Avoided | Reason |
|---|---|---|
| | **Proposed Action MP** | |
| 0-43 | November 15 to April 1 | Big Game Winter Range |
| 4-9 | March 1 to June 30 | Sage Grouse Habitat |
| 5-26 | March 15 to June 15 | Waterfowl Area |
| 17-18 | March 1 to June 30 | Sage Grouse |
| 18 | March 15 to July 15 | [1]Raptor Habitat |
| 22-26 | March 1 to June 15 | Sage Grouse Habitat |
| 27-29 | March 15 to July 15 | Raptor Habitat |
| 29 | March 15 to July 15 | Golden Eagle Nest |
| 30-41 | March 1 to June 30 | Sage Grouse Habitat |
| 36-39 | April 15 to July 15 | Waterfowl Area |
| 40 | March 15 to July 15 | Raptor Habitat |
| 49-52 | March 1 to June 30 | Sage Grouse Habitat |
| 49-52 | November 15 to April 1 | Big Game Winter Range |
| 68-92 | November 15 to April 1 | Big Game Winter Range |
| 129-158 | March 15 to July 15 | Raptor Habitat |
| 130-140 | April 15 to July 15 | Waterfowl Area |
| 134-139 | March 1 to June 30 | Sage Grouse Habitat |
| 152-163 | November 15 to April 1 | Big Game Winter Range |
| 155 | December 1 to March 31 | Bald Eagle Winter Habitat |

TABLE C-4—Continued

| Approximate MP | Dates When Construction Would be Avoided | Reason |
|---|---|---|
| 165 | March 15 to July 15 | Golden Eagle Nest |
| 165-168 | November 15 to April 1 | Big Game Winter Range |
| 165-169 | March 15 to July 15 | Raptor Habitat |
| 165-170 | November 15 to April 1 | Big Game Winter Range |
| 173-176 | March 1 to June 30 | Sage Grouse Habitat |
| 182-184 | November 15 to April 1 | Big Game Winter Range |
| 188-193 | November 15 to April 1 | Big Game Winter Range |
| | **Central Nevada MP** | |
| 5-13 | November 15 to April 1 | Big Game Winter Range |
| 11-19 | March 1 to June 30 | Sage Grouse Habitat |
| 19-27 | November 15 to April 1 | Big Game Winter Range |
| 145-150 | March 1 to June 30 | Sage Grouse Habitat |
| 152-154 | March 1 to June 30 | Raptor Habitat |
| 156-158 | November 15 to April 1 | Big Game Winter Range |
| 157-196 | March 1 to June 30 | Raptor Habitat |
| 165-169 | March 1 to June 30 | Sage Grouse Habitat |
| 170-185 | November 15 to April 1 | Big Game Winter Range |
| 187-196 | March 1 to June 30 | Sage Grouse Habitat |
| 200-207 | March 1 to June 30 | Sage Grouse Habitat |
| 202-204 | March 1 to June 30 | Raptor Habitat |
| 205-207 | November 15 to April 1 | Big Game Winter Range |
| 224-230 | November 15 to April 1 | Big Game Winter Range |
| 234-247 | November 15 to April 1 | Big Game Winter Range |
| 235-238 | March 1 to June 30 | Raptor Habitat |
| 235-240 | May 15 to September 15 | [2]Desert Bighorn Sheep Area |
| 238-240 | March 15 to June 15 | Waterfowl Area |
| 240-248 | March 1 to June 30 | Sage Grouse Habitat |
| 310-313 | March 1 to June 30 | Raptor Habitat |
| 329-331 | March 1 to June 30 | Raptor Habitat |
| 334-341 | March 1 to June 30 | Raptor Habitat |
| 385 | May 15 to September 15 | Desert Bighorn Sheep |
| 402 | May 15 to September 15 | Desert Bighorn Sheep |
| 428-435 | November 15 to April 1 | Big Game Winter Range |
| 439-446 | November 15 to April 1 | Big Game Winter Range |
| 485-487 | March 1 to June 1 | Waterfowl Areas |
| 525-542 | March 1 to June 1 | Waterfowl Areas |
| 565-569 | March 1 to June 1 | Waterfowl Areas |

[1]This period should be avoided only if pipeline construction would occur within 1/2 mile of an active raptor nest.

[2]This period should be avoided only if pipeline construction would occur within 2 miles of a desert bighorn sheep water source.

## TABLE C-5

## CRUCIAL WILDLIFE USE AREAS AND PERIODS TO BE AVOIDED ALONG THE SEVIER-ESCALANTE DESERT ALTERNATIVE (D)

| Approximate MP | Dates When Construction Would be Avoided | Reason |
|---|---|---|
| | **Proposed Action MP** | |
| 0-43 | November 15 to April 1 | Big Game Winter Range |
| 4-9 | March 1 to June 30 | Sage Grouse Habitat |
| 5-26 | March 15 to June 15 | Waterfowl |
| 17-18 | March 1 to June 30 | Sage Grouse |
| 18 | March 15 to July 15 | [1]Raptor Habitat |
| 22-26 | March 1 to June 15 | Sage Grouse Habitat |
| 27-29 | March 15 to July 15 | Raptor Habitat |
| 29 | March 15 to July 15 | Golden Eagle Nest |
| 30-41 | March 1 to June 30 | Sage Grouse Habitat |
| 36-39 | April 15 to July 15 | Waterfowl Area |
| 40 | March 15 to July 15 | Raptor Habitat |
| 49-52 | March 1 to June 30 | Sage Grouse Habitat |
| 49-52 | November 15 to April 1 | Big Game Winter Range |
| 68-92 | November 15 to April 1 | Big Game Winter Range |
| 129-158 | March 15 to July 15 | Raptor Habitat |
| 130-140 | April 15 to July 15 | Waterfowl Area |
| 134-139 | March 1 to June 30 | Sage Grouse Habitat |
| 152-163 | November 15 to April 1 | Big Game Winter Range |
| 155 | December 1 to March 31 | Bald Eagle Winter Habitat |
| 165 | March 15 to July 15 | Golden Eagle Nest |
| 165-168 | November 15 to April 1 | Big Game Winter Range |
| 165-169 | March 15 to July 15 | Raptor Habitat |
| 165-170 | November 15 to April 1 | Big Game Winter Range |
| 173-176 | March 1 to June 30 | Sage Grouse Habitat |
| 182-184 | November 15 to April 1 | Big Game Winter Range |
| 188-193 | November 15 to April 1 | Big Game Winter Range |
| | **Sevier-Escalante Desert MP** | |
| 5-13 | November 15 to April 1 | Big Game Winter Range |
| 11-19 | March 1 to June 30 | Sage Grouse Habitat |
| 19-27 | November 15 to April 1 | Big Game Winter Range |
| 45-47 | March 15 to June 30 | Waterfowl Area |
| 67 | March 1 to June 30 | Golden Eagle Nest |
| 83 | March 1 to June 30 | Raptor and Golden Eagle Nesting Area |
| 93 | March 1 to June 30 | Raptor and Golden Eagle Nesting Area |
| 128 | March 1 to June 30 | Raptor and Golden Eagle Nesting Area |
| 128-139 | November 15 to April 1 | Big Game Winter Range |
| 135 | March 1 to June 30 | Raptor and Golden Eagle Nesting Area |

## TABLE C-5—Continued

| Approximate MP | Dates When Construction Would be Avoided | Reason |
|---|---|---|
| | **Proposed Action MP** | |
| 367-379 | November 15 to April 1 | Big Game Winter Range |
| 381-407 | November 15 to April 1 | Big Game Winter Range |
| 404-407 | March 1 to June 30 | Raptor Habitat |
| 435-445 | May 15 to September 15 | [2]Desert Bighorn Sheep Area |
| 440-447 | May 15 to September 15 | Quail Management Areas |
| 463 | May 15 to September 15 | Desert Bighorn Sheep |
| 477-488 | March 1 to June 30 | Golden Eagle Nesting Area |
| 485 | May 15 to September 15 | Desert Bighorn Sheep |
| 494 | May 15 to September 15 | Desert Bighorn Sheeop |
| 509-515 | May 15 to September 15 | Desert Bighorn Sheep |
| 510-515 | March 1 to June 30 | Golden Eagle Nesting Area |
| 537 | May 15 to September 15 | Desert Bighorn Sheep |
| 539-541 | May 15 to September 15 | Quail Management Area |
| 548 | May 15 to September 15 | Desert Bighorn Sheep |
| 551-556 | May 15 to September 15 | Quail Management Area |
| 556-570 | May 15 to September 15 | Desert Bighorn Sheep |
| 560-578 | May 15 to September 15 | Quail Management Area |

[1]This period should be avoided only if pipeline construction would occur within 1/2 mile of an active raptor nest.

[2]This period should be avoided only if pipeline construction would occur within 2 miles of a desert bighorn sheep water source.

## TABLE C-6

## CRUCIAL WILDLIFE USE AREAS AND PERIODS TO BE AVOIDED ALONG THE WEST SALT LAKE ALTERNATIVE (E)

| Approximate MP | Dates When Construction Would be Avoided | Reason |
|---|---|---|
| | **West Salt Lake MP** | |
| 0-10 | November 15 to April 1 | Big Game Winter Range |
| 66-70 | November 15 to April 1 | Big Game Winter Range |
| 73-86 | November 15 to April 1 | Big Game Winter Range |
| 96-102 | November 15 to April 1 | Big Game Winter Range |
| 120-128 | March 1 to June 30 | Sage Grouse Habitat |
| 142-161 | March 1 to June 30 | Sage Grouse Habitat |
| 150-161 | March 1 to June 30 | [1]Raptor Habitat |
| 170-180 | March 1 to June 30 | Raptor Habitat |
| 290-293 | November 15 to April 1 | Big Game Winter Range |
| 292-297 | March 1 to June 30 | Sage Grouse Habitat |

TABLE C-6—Continued

| Approximate MP | Dates When Construction Would be Avoided | Reason |
|---|---|---|
| | **Proposed Action MP** | |
| 276-280 | November 15 to April 1 | Big Game Winter Range |
| 281-284 | March 1 to June 30 | Sage Grouse Habitat |
| 288-296 | November 15 to April 1 | Big Game Winter Range |
| 290-294 | March 1 to June 30 | Raptor Habitat |
| 307 | March 1 to June 30 | Golden Eagle Nest |
| 313 | March 1 to June 30 | Golden Eagle Nest |
| 356-358 | March 1 to June 30 | Raptor Habitat |
| 367-379 | November 15 to April 1 | Big Game Winter Range |
| 381-407 | November 15 to April 1 | Big Game Winter Range |
| 404-407 | March 1 to June 30 | Raptor Habitat |
| 435-445 | May 15 to September 15 | [2]Desert Bighorn Sheep Area |
| 440-447 | May 15 to September 15 | Quail Management Areas |

[1]This period should be avoided only if pipeline construction would occur wit n 1/2 mile of an active raptor nest.

[2]This period should be avoided only if pipeline construction would occur within 2 miles of a desert bighorn sheep water source.

TABLE C-7

CRUCIAL WILDLIFE USE AREAS TO BE AVOIDED ALONG THE PROVO CANYON ALTERNATIVE (F)

| Approximate MP | Dates When Construction Would be Avoided | Reason |
|---|---|---|
| | **Proposed Action MP** | |
| 0-43 | November 15 to April 1 | Big Game Winter Range |
| 4-9 | March 1 to June 30 | Sage Grouse Habitat |
| 5-26 | March 15 to June 15 | Waterfowl Area |
| 17-18 | March 1 to June 30 | Sage Grouse |
| 18 | March 15 to July 15 | [1]Raptor Habitat |
| 22-26 | March 1 to June 15 | Sage Grouse Habitat |
| 27-29 | March 15 to July 15 | Raptor Habitat |
| 29 | March 15 to July 15 | Golden Eagle Nest |
| 30-41 | March 1 to June 30 | Sage Grouse Habitat |
| 36-29 | April 15 to July 15 | Waterfowl Area |
| 40 | March 15 to July 15 | Raptor Habitat |
| 49-52 | March 1 to June 30 | Sage Grouse Habitat |
| 49-52 | November 15 to April 1 | Big Game Winter Range |
| 68-92 | November 15 to April 1 | Big Game Winter Range |
| | **Provo Canyon MP** | |
| 3-11 | March 1 to June 30 | Raptor Golden Eagle Area |
| 11-39 | November 15 to April 1 | Big Game Winter Range |
| 21-39 | March 1 to June 30 | Raptor and Golden Eagle Area |
| 87-105 | November 15 to April 1 | Big Game Winter Range |
| 89-100 | March 1 to June 30 | Raptor Golden Eagle Area |
| 105-113 | March 1 to June 30 | Raptor Golden Eagle Area |
| | **Proposed Action MP** | |
| 214-224 | November 15 to April 1 | Big Game Winter Range |
| 276-280 | November 15 to April 1 | Big Game Winter Range |
| 281-284 | March 1 to June 30 | Sage Grouse Habitat |
| 288-296 | November 15 to April 1 | Big Game Winter Range |
| 290-294 | March 1 to June 30 | Raptor Habitat |
| 307 | March 1 to June 30 | Golden Eagle Nest |
| 313 | March 1 to June 30 | Golden Eagle Nest |
| 356-358 | March 1 to June 30 | Raptor Habitat |
| 367-379 | November 15 to April 1 | Big Game Winter Range |
| 381-407 | November 15 to April 1 | Big Game Winter Range |
| 404-407 | March 1 to June 30 | Raptor Habitat |
| 435-445 | May 15 to September 15 | [2]Desert Bighorn Sheep Area |
| 440-447 | May 15 to September 15 | Quail Management Areas |
| 463 | May 15 to September 15 | Desert Bighorn Sheep |
| 477-488 | March 1 to June 30 | Golden Eagle Nesting Area |
| 485 | May 15 to September 15 | Desert Bighorn Sheep |
| 494 | May 15 to September 15 | Desert Bighorn Sheep |
| 509-515 | May 15 to September 15 | Desert Bighorn Sheep |
| 510-515 | March 1 to June 30 | Golden Eagle Nesting Area |
| 537 | May 15 to September 15 | Desert Bighorn Sheep |
| 539-541 | May 15 to September 15 | Quail Management Area |
| 548 | May 15 to September 15 | Desert Bighorn Sheep |
| 551-556 | May 15 to September 15 | Quail Management Area |
| 556-570 | May 15 to September 15 | Desert Bighorn Sheep |
| 560-578 | May 15 to September 15 | Quail Management Area |

[1]This period should be avoided only if pipeline construction would occur within 1/2 mile of an active raptor nest.

[2]This period should be avoided only if pipeline construction would occur within 2 miles of a desert bighorn sheep water source.

TABLE C-8

CRUCIAL WILDLIFE USE AREAS TO BE AVOIDED ALONG THE VARIATIONS

| Approximate MP | Dates When Construction Would be Avoided | Reason |
|---|---|---|
| | **Thistie Creek Variation** | |
| 0-2 | November 15 to April 1..... | Big Game Winter Range |
| 8-27 | March 1 to June 30 ..... | [1]Raptor Habitat |
| 9-27 | November 15 to April 1..... | Big Game Winter Range |
| 0-27 | December 1 to March 31.. | Bald Eagle Winter Habitat |
| | **Las Vegas Variation** | |
| 14 | May 15 to September 15.. | [2]Desert Bighorn Sheep |
| 28-30 | May 15 to September 15.. | Desert Bighorn Sheep |
| 32 | May 15 to September 15.. | Desert Bighorn Sheep |
| 35 | May 15 to September 15.. | Desert Bighorn Sheep |
| 53 | May 15 to September 15.. | Desert Bighorn Sheep |
| | **Miii Creek Variation** | |
| 0-21 | November 15 to April 1..... | Big Game Winter Range |
| | **Daniels Canyon Variation** | |
| 27-36 | March 15 to June 15..... | Waterfowl Area |

[1]This period should be avoided only if pipeline construction would occur within 1/2 mile of an active raptor nest.

[2]This period should be avoided only if pipeline construction would occur within 2 miles of a desert bighorn sheep water source.

**MEASURE:** In order to reduce harassment to wildlife, particularly big game animals on their winter ranges, all construction access roads will be decommissioned to eliminate public access. If access roads are necessary for operation and maintenance, they must be approved by the authorized officer and will be clearly marked 'No Access Except Authorized Vehicles.' In high-use areas, BLM or FS may direct RMPC to install and maintain gates to limit access.

**EFFECTIVENESS:** This measure is anticipated to be successful in reducing increased public access to critical game areas which would be created by new access roads along the pipeline right-of-way. However, in some areas, vandalism to gates might require frequent RMPC monitoring and maintenance.

**APPLICATION:** This measure will be applied to the proposed action or to any alternative or variation which is selected.

**MEASURE:** No camping or parking will be allowed at or near any livestock watering source, artificial water source, or spring, so that use by wildlife and domestic livestock will not be hampered. The restricted area will be determined by the authorized officer; the recommended distance is 2 miles for desert bighorn sheep and 1 mile in quail and other upland game bird areas.

**EFFECTIVENESS:** Restricting camping or parking by construction crews will eliminate harassment of animals needing water. This measure will be especially effective in minimizing impact during the summer in upland game bird management areas and desert bighorn sheep areas, but it will also alleviate unintentional interference with wildlife along the entire right-of- way.

**APPLICATION:** This measure will be applied to the proposed action and any alternative or variation which is selected.

**MEASURE:** Shortly before any construction activities begin in an area containing desert tortoise habitat, the Authorized Officer will have surveyed and flagged all tortoise burrows in the construcion zone.

Immediately prior to surface disturbance, all flagged tortoise burrows will be checked for tortoises by a qualified biologist, and all tortoises will be hand-removed and carried a designated distance away from the area of activity.

Prior to each day's work in areas containing desert tortoise habitat, the open trench will be patrolled by foot and any tortoises which have become trapped in the trench will be hand-removed and carried a designated distance away from the area of the days activity.

**EFFECTIVENESS:** The measure should help prevent most direct tortoise mortality in the construction zone.

**APPLICATION:** This measure will be applied to the proposed action, and all alternatives plus the East Las Vegas and the Fort Mojave Variations.

## Recreation Resource

**MEASURE:** To ensure the safety of ORV competitors and spectators participating in the Mint 400 ORV event, construction along the proposed route (approximately between MP 480 to MP 487, known also as the Dry Lake Valley) will not take place from 7 days before the Mint 400 event until 1 day after- ward. After the pipeline is aligned, the Author-

ized Officer will designate the specific boundaries of the restricted area.

**EFFECTIVENESS:** This measure will help to ensure that construction of the pipeline does not unduly endanger the safety of the race spectators and participants. The length of the restriction will ensure that the people participating in the activities preceding the event are also protected. These activities (prerunning the race course and related casual uses) for events of this magnitude commonly occur a week or more in advance of the event.

**APPLICATION:** This measure will be applied to the proposed action or to the Sanpete Valley Alternative, Sevier-Escalante Desert Alternative, West Salt Lake Alternative, or the Provo Canyon Alternative, depending upon which is selected.

**MEASURE:** To reduce dust intrusion upon the recreational experiences of users of the Strawberry Reservoir Recreation area (approximately between MP 131 and MP 140), the RMPC contractor will be directed by the Authorized officer to regularly spray dust abatement solvents or water along the pipeline construction route and dirt access roads.

**EFFECTIVENESS:** This measure will lessen ambient dust which may drift into intensively used recreation areas.

**APPLICATION:** This measure will be applied to the proposed action if it is selected.

**MEASURE:** To reduce dust intrusions upon the recreational experiences of users of the Frenchman Mountain-Rainbow Gardens Area and the proposed Clark County Wetlands Park (approximately between MP 496 and MP 501), the RMPC contractor will be directed by the Authorized Officer to regularly spray dust abatement solvents or water along the pipeline construcion route and dirt access roads.

**EFFECTIVENESS:** This measure will lessen ambient dust which may drift into the Frenchman Mountain-Rainbow Gardens proposed National Natural Landmark and the proposed Clark County Wetlands Park.

**APPLICATION:** This measure will be applied to the proposed action or to the Sanpete Valley Alternative, Sevier-Escalante Desert Alternative, West Salt Lake Alternative, or Provo Canyon Alternative, depending upon which is selected.

**MEASURE:** To reduce dust intrusions upon the recreational experiences of users on lands surrounding State Highway 36 within the Caribou National Forest along the West Salt Lake Alternative (approximately MP 10 to MP 22), the RMPC contractor will be directed by the Authorizing Officer to regularly spray dust abatement solvents or water along the pipeline construction route and dirt access roads.

**EFFECTIVENESS:** This measure will lessen ambient dust which may drift into FS recreation lands during peak weekend use (e.g. Emigration Canyon Campground and disperse recreation areas along State Highway 36, Strawberry Springs, etc.).

**APPLICATION:** This measure will be applied to the West Salt Lake Alternative if it is selected.

**MEASURE:** In order to reduce dust intrusions upon the recreational experiences of users of the west shore area of the Strawberry Reservoir along the Daniels Canyon Variation (approximately between MP 28 and MP 36), the RMPC contractor will be directed by the authorized officer to regularly spray dust abatement solvents or water along the pipeline construction route or dirt access roads.

**EFFECTIVENESS:** This measure will lessen ambient dust which may drift into the intensively used Strawberry Reservoir area.

**APPLICATION:** This measure will be applied to the Daniels Canyon Variation if it is selected.

**MEASURE:** The Authorized Officer will direct the RMPC and its contractors to halt work in certain areas on certain holidays which are intensively used by the public. These include, but are not limited to, holidays and 3 day weekends such as Independence Day, Memorial Day, Labor Day, Thanksgiving, the 24th of July (or Pioneer Day in Utah), and the several weeks of regular deer season.

**EFFECTIVENESS:** This measure will lessen safety hazards and degradation of recreation experiences. The stopping of work during deer season will lessen safety hazards to the construction crews and will help keep the deer from being driven from their habitual range.

**APPLICATION:** This measure will be applied to all routes if they are selected.

## Wilderness

**MEASURE:** The Central Nevada Alternative pipeline alignment will cross to the south side of U.S. Highway 6/50, east of the Notch Peak WSA (approximately MP 93). At MP 100 the alignment will be placed within the highway right-of- way for the length of the WSA's border. At approximately MP 102, where the Notch Peak WSA boundary leaves the highway, the pipeline alignment will return to the north side of the highway outside of the right-of-way. Permits from the Utah Department of Transportation will be required.

The Central Nevada Alternative pipeline alignment will be placed within the U.S. Highway 6 right-of-way (approximately at MP 308). This will require permits from the Nevada Department of Transportation.

**EFFECTIVENESS:** This measure would avoid permanent impairment of the lands suitable for preservation as wilderness, thereby allowing Congress to make the ultimate decision on these two WSA units, as mandated in section 603(c) of the Federal Land Policy and Management Act.

**APPLICATION:** This measure will be applied to the Central Nevada Alternative if it is selected.

## Land Uses

**MEASURE:** Upon abandonment, the Authorized Officer will require the RMPC to remove sections of pipe in certain areas and to rehabilitate the surface under the procedures required in the Erosion Control, Revegetation, and Restoration Guidelines for use on Federal lands.

**EFFECTIVENESS:** Such removal will eliminate potential conflicts with watershed productivity and other rights-of-way.

**APPLICATION:** This measure will be applied to the proposed action or to any of the alternatives and variations.

**MEASURE:** If the responsible officials select Alternative E, West Salt Lake, as the route for which a right-of-way would be granted, the route will be shifted within the Caribou National Forest to follow the transmission line corridor which parallels the alternative within 1 to 3 miles. A supplementary environmental assessment will be prepared before the right-of-way is granted to ensure adequate consideration of the resource.

**EFFECTIVENESS:** The transmission line corridor appears to be better suited for placement of a pipeline. However, the alternative was not redesigned to incorporate it. Consequently, unless the supplementary environmental assessment were to identify previously unknown resources which would be significantly affected, a shift of the route to follow the transmission line would be more compatible with multiple use of the resources.

**APPLICATION:** The measure will be applied to the West Salt Lake Alternative if it is selected.

## Visual Resources

**MEASURE:** In visually sensitive areas on Federal lands, the pipeline alignment will take advantage of natural openings in forest and brush vegetation types, in order to lessen the visual straight-line effect of right- of-way clearings. The Authorized Officer will help to determine a balanced approach to visual, engineering, and restoration concerns. Visually sensitive areas are those where acceptable levels of visual contrast, based upon VRM Classes and VQO's, would be exceeded.

**EFFECTIVENESS:** Contrast ratings which were prepared for the areas of significant visual impact indicate that, in most cases, the portion of the proposed project which would create the greatest degree of unacceptable visual contrast would be the straight-line vegetative clearing limits. By routing the pipeline alignment into natural openings, the contrast would be significantly lessened.

**APPLICATION:** This measure will be applied to the proposed action and to any alternative or variation which is selected.

**MEASURE:** Clearing vegetation for the pipeline alignment in visually sensitive areas on Federal lands will incorporate feathering the edges when no natural vegetative openings occur. Visually sensitive areas are those where acceptable levels of visual contrast, based upon VRM Classes and VQO's, would be exceeded.

**EFFECTIVENESS:** Contrast ratings indicate that, in most cases, the components of the proposed project which would create the greatest degree of unacceptable visual contrast would be the clearing of vegetation to the edge of the right-of-way along a straight line. In areas of a continuous pattern of vegetation, the contrast would be significantly lessened by feathering straight-line clearings (overclearing in some locations and clearing less than the standard 100-foot wide construction right-of-way in other areas to simulate natural vegetative patterns).

**APPLICATION:** This measure will be applied to the proposed action and to any alternative or variation which is selected.

# Appendix D
# Summary of Required Authorizing Actions

In order to implement the RMPP, certain Federal, state, and local authorizing actions would have to be taken. Examples of authorizing actions are approval of a certificate of public convenience and necessity, right-of- way grants, stream crossing permits, microwave communication licenses, and air quality permits. In general, the same authorizing actions would be necessary for the alternatives. These authorizing actions are listed below. This list is not complete, since detailed locations and construction plans and techniques are not yet developed.

To implement the RMPP, the following authorizing actions would be required by the certain Federal, state, and local agencies.

## Federal Authorizations and Permits

***FERC.*** Co-lead agency

If the FERC approves the project, it would:

1. Issue a certificate to RMPC for construction, ownership, and operation of an interstate natural gas transmission system extending from the vicinity of Sage, Wyoming, through Utah and Nevada, to a point near Searchlight, Nevada, on the Nevada-California border. As part of its review process before making a determination on whether to issue a certificate, the FERC will examine such factors as the company's gas supply, the market to be served, proposed rates, engineering of the system, the environmental impact, and whether the project would be in the public interest. Authority for issuing the certificate is established by section 7(c) of the Natural Gas Act. The certificate would be issued by the five commissioners located in Washington, D.C.

Since the RMPC would own only the gas that is needed to initially fill the capacity of the proposed pipeline, additional applications with the FERC seeking authorization to transport and sell deliver the gas that would be transported by the proposed project would have to be filed. It is not possible to predict the number of additional certificates this may involve until such filings are made.

If Northwest or El Paso propose to change their contractual obligations after obtaining authorization by the FERC, they would have to file new applications or seek amendments to their existing certificates.

***Bureau of Land Management, U.S. Department of the Interior (BLM).*** Co-lead agency.

If the BLM approves the proposal, it would issue right-of-way grants across both public lands administered by the BLM and National Forest System Lands administered by the FS. Therefore, the BLM would:

1. Grant a right-of-way up to 50-feet wide for construction and operation of an interstate natural gas pipeline system across approximately 312 miles of Federal lands (BLM/FS-administered lands). The right-of-way would be issued by the BLM Utah State Director in Salt Lake City under section 28 of the Mineral Leasing Act of 1920 (as amended). Additionally, an undetermined number of right-of-way grants would be issued for all miles of permanent access roads on public lands to communication sites, utilities, and maintenance bases.
2. Grant a temporary use permit (TUP) up to 50-feet wide for construction immediately adjacent to the permanent right-of-way. The TUP's for the 261- mile long proposed route which would cross lands administered by the BLM (not FS) would be issued by the BLM Utah Director under section 28 of the Mineral Leasing Act of 1920 (as amended). Additional TUP's would be granted for such actions as soil testing, seismic testing, storage yards, disposal sites, temporary access roads, etc., by the BLM District or Area Managers in the Salt Lake City, Richfield, and Cedar City Districts in Utah; the Las Vegas District in Nevada; and the Riverside District in California.
3. Grant the sale of common variety mineral materials such as sand, gravel, rock, and clay from public lands as authorized by title V of Federal Land Policy and Management Act (FLPMA). These grants would be issued by either the BLM District or Area Managers listed in item 2.
4. Grant an unknown number of rights-of-way for construction and operation of power transmission lines crossing public lands. The rights-of-way would be issued by the appropriate District Manager in Wyoming, Utah, Nevada, and California.
5. Review and recommend to the National Park Service Interagency Archaeological Consulting Division the issuance of antiquities permits on

lands administered by the BLM. This review would be made by the BLM Utah State Office, which would also recommend whether to issue antiquities permits.

***Bureau of Indian Affairs, U.S. Department of the Interior (BIA).*** Cooperating Agency.

If the proposal is approved, the BIA would:

1. Grant a 50-foot-wide right-of-way for construction and operation across approximately 7 miles of tribal Indian lands in Nevada. The right-of-way would cross the boundary of the Moapa Indian Reservation, established in December 1980 within the Phoenix area jurisdication of the BIA. The tribal council for the Moapa Indian Reservation would review and approve the right-of-way. In accordance with the Act of February 5, 1948, 62 Stat. 17(25 USC 323- 328), 25 CFR 161, authority to issue the right-of-way grant rests with the BIA superintendent in charge of the reservation which the project would cross.
2. Grant a 50-foot wide right-of-way for construction and operation across approximately 4 miles of tribal Indian lands in California. The right-of-way would cross the Fort Mojave Indian Reservation within the Phoenix area jurisdiction of the BIA. The tribal council for the Fort Mojave Indian Reservation would review and approve the right-of-way. In accordance with the act of February 5, 1948, 62 Stat. 17 (25 USC 323-328), 25 CFR 161, authority to issue the right-of-way grant rests with the BIA superintendent in charge of the reservation which the project would cross.

***Water and Power Resources Service, U.S. Department of the Interior (WPRS).*** Cooperating Agency.

If the proposal is approved, the WPRS would issue licenses across both purchased and withdrawn land for three separate areas along the proposed route under the WPRS jurisdiction. Therefore, the WPRS would:

1. Grant a license for construction and operation across approximately a half mile of land purchased by the WPRS in the Rockport Lake State Recreation area. In accordance with the Reclamation Projects Act of August 4, 1939, 53 Stat. 1189, section 10, (Regulations WPRS Instructions part 215.6), authority to issue the license rests with the WPRS Regional Director, Upper Colorado Region, Salt Lake City, Utah.
2. Grant a license for construction and operation across approximately 18 miles of land withdrawn by WPRS in the Strawberry Reservoir area. The authorized officer and authority are the same as for the first authorizing action.
3. Grant a license for construction and operation across approximately 1 mile of land withdrawn by WPRS east of Las Vegas. In accordance with the authority previously discussed, the license would be issued by the WPRS Regional Director, Lower Colorado Region, Boulder City, Nevada.

***U.S. Forest Service, U.S. Department of Agriculture (FS).*** Cooperating Agency.

The BLM would issue the permanent construction and operation right-of-way grants to cross the 34 miles of National Forest System Lands. The FS would have to concur with the permanent right-of-way traversing the Uinta, Manti- LaSal, Fishlake, and Dixie National Forests before the BLM could issue such a right-of-way grant. Forest supervisors of the Uinta, Manti-LaSal, Fishlake, or Dixie National Forests would issue various temporary permits before, during, and immediately after construction. Before any permits or uses on National Forest System Lands were issued, site-specific environmental analyses would coordinate, mitigate, and formulate management requirements for the construction and use of National Forest System Lands. Therefore, the FS would:

1. Grant road and trail permits as needed for the construction or use of roads and trails. All FS development roads used would require a road use permit dictating safety measures, required improvement work, and maintenance responsibilities during and after the pipeline construction. All roads on National Forest System Lands would be constructed following FS approval based on specific analyses of suggested locations. Road and trail permits for construction or use of roads and trails across National Forest System Lands would be issued under the authority of 36 CFR 251.50, Land Uses.
2. Grant temporary special use permits for planning, survey, study, and construction. Equipment storage, staging, or temporary crew quarters would require temporary special use permits. These permits would be issued under the authority of 36 CFR 251.50, Land Uses.
3. Grant mineral materials permits to remove common variety materials such as sand, gravel, rock, and clay from National Forest System Lands, authorized by 36 CFR 251.4, Disposal of Materials.
4. Grant timber sale contracts or permits for sale and disposal of timber and other vegetative material from National Forest Lands. Timber removed from National Forest System Lands would be sold to the RMPC contractor and removed from the forest or completely disposed as directed by the FS. Authority to issue these

contracts or permits derives from 36 CFR 223.1, Sale and Disposal of Timber.

5. Grant antiquities permits to examine ruins, excavate archaeological sites, and collect objects of antiquity from National Forest System Lands. Authority to issue these permits is contained in 16 USC 431-433, Antiquities Act of 1906; 16 USC 551, Organic Act of 1897; and 43 CFR 3, Preservation of American Antiquities.

6. Grant special use permits for permanent communication sites, electrical power transmission lines, cathodic protection needs, etc., on National Forest system lands. These facilities would be authorized under 36 CFR 251.50, Land Use.

***U.S. Army Corps of Engineers, U.S. Department of the Army (COE).***

Under section 404 of the Clean Water Act of 1977, as implemented by the U.S. Army Corps of Engineers (COE) regulations (33 CFR 323), placement of dredged or filled material for bedding or backfilling pipeline crossings at streams or rivers is permitted under the Nationwide Permit for utility lines (33 CFR 323.4 and 323.4-3), provided that the conditions outlined in appendix D-3 are met. A 'utility line' is defined by the Nationwide Permit as any pipe or pipeline for the transportation of any gaseous, liquid, liquefiable, or slurry substance, for any purpose, and any cable, line, or wire for the transmission for any purpose of electrical energy, telephone and telegraph messages, and radio and television communications. The permits would be necessary for streams crossed by the proposed pipeline 'below the headwaters,' defined as the point on a stream where the average annual flow is more than 5 cubic feet per second. A Nationwide 404 Permit would be required for the RMPP from either the COE Los Angeles or Sacramento District.

The COE has the discretionary authority to require individual Section 404 Permits for all or portions of the pipeline crossings if the District Engineer determines that the concerns of the aquatic environment indicate a need for such action (33 CFR 323.4-4). An Individual Section 404 permit would be required for RMPC to place fill material in a stream for a construction pad or to divert the flow of any of the streams (i.e., use cofferdams). No Individual Section 404 Permit would be required for construction above the headwaters.

The COE has established the following procedures for processing applications for individual (section 404) Department of the Army permits:

1. Based on project description supplied by the participating companies, the appropriate COE District Office(s) determines whether an individual Department of the Army permit is required.

2. The COE District Office distributes a public notice requesting comment on the permit applications. Comments are received for 30 days.

3. Following the comment period, all public input is evaluated. If requested, the COE District Engineer may require a formal public hearing. Upon receipt of comments, the District Engineer will offer the applicant an opportunity to resolve any potential adverse impact. The District Engineer will also make a public interest review, and should the review be positive, a Department of the Army permit will be issued.

4. If a formal public hearing is necessary, all public input and pertinent information will be reevaluated, and the COE District Engineer will make a decision about the Department of the Army permit.

5. The Department of the Army can decide to issue the permit 30 days after the RMPP Final EIS is filed with the EPA, if all the COE permit procedures have been completed.

6. The COE also requires a consent to those portions of the pipeline crossing lands over which the United States acquired only an easement interest (Federal Government's fee ownership). Processing would be concurrent with that of the permit application.

***National Park Service, U.S. Department of the Interior (NPS)***

Due to the abolishment of the Heritage Conservation and Recreation Service, the NPS now authorizes antiquities permits following review and recommendations from the BLM state offices. This procedure contrasts with the FS, which has its own authority to issue antiquities permits. Under current law, the NPS grants antiquities permits to examine ruins, excavate archeological sites, and collect objects of antiquity from public lands adminstered by the BLM. These permits are granted by the Interagency Archaeological Consulting Division of the NPS, based on BLM recommendations, under the authority of the Antiquities Act of 1906.

***Federal Communications Commission (FCC)***

A separate operating license for each new repeater station would be necessary. RMPC intends to use existing communications sites wherever possible. Authority for issuing the microwave licenses is contained in the FCC Rules and Regulations (Volume V, parts 90 and 94, 47 CFR) which governs private repeater stations.

***U.S. Environmental Protection Agency (EPA)***

The EPA would issue national pollutant discharge elimination system (NPDES) permit(s) for all potential sites where water used to hydrostatically test for leaks in the proposed pipeline would be discharged. The permit(s) would specify the terms and conditions under which discharge could occur, including the quality of the discharge water. Application for NPDES permits in Utah would be filed with EPA's Region 8 Office in Salt Lake City. Jurisdiction for NPDES permits for Wyoming, Nevada, and California has been delegated to the states.

## State and Local Authorizations and Permits

The following permits might be required.

### Wyoming

1. Permits to construct and operate a compressor station near Sage, Wyoming, would be issued by the Wyoming Department of Environmental Quality, Division of Air Quality.
2. NPDES permits for all discharges of polluted hydrostatic test water would be issued by the Wyoming Department of Environmental Quality.

### Utah

1. A right-of-way grant to cross approximately 1 mile of state park lands would be issued by the Division of Parks and Recreation for the Rockport Lake State Recreation Area.
2. An encroachment permit to cross state and interstate highways or place the pipeline within an existing utility corridor would be issued by the Utah Department of Transportation.
3. Permits to comply with environmental regulations would be issued by the Utah Department of Health, Division of Environmental Health. These include:
   a) Approval to establish any construction camps or double-jointing yards.
   b) Construction permits to cross streams on state lands.
   c) Air quality permits (dependent upon construction techiques).
4. Permits to survey on state lands for archaeological and historical purposes issued by the Utah Division of State History.
5. A conditional use permit would be issued by the Cache County Planning and Zoning Commission.

### Nevada

1. A permit for package sewage treatment or septic tanks that might be required for construction camps would be issued by the Nevada Division of Environmental Protection, Water, and Air Quality.
2. Land clearing permits for state lands would be issued by the Nevada Division of Environmental Protection, Water, and Air Quality. A portion of the proposed project would go through a nonattainment area and would have to meet the lowest achievable emission control.
3. Waste water discharge permits would be issued by the Nevada Division of Environmental Protection, Water, and Air Quality.
4. Revocable or encroachment permit to cross a state highway or to place the pipeline within an existing highway right-of-way would be issued by the Nevada Department of Transportation, District 1.
5. Permits to survey on state lands for archaeological and historical resources would be issued by the Nevada State Museum in Carson City, Nevada.
6. A conditional use permit to cross unincorporated areas within Clark County would be required. Following a public hearing which would be held by the Clark County Planning Commission, the permit would be issued by the Clark County Board of Commissioners. This permit is authorized under title 29 of the Clark County Code.
7. A conditional use permit to cross within the city limits of Henderson would be necessary. Following a public hearing by the City of Henderson Planning Commission, the permit would be issued by the Henderson City Council. Authority for this permit falls under title 19 of the Henderson Municipal Code (Nevada Revised Statutes 278).

### California

1. A certificate of public convenience and necessity from the CPUC authorizing PG&E and the PLS to construct and operate a 27-mile long 36-inch diameter pipeline within California would be required.

2. A construction permit with attached safety standards would be issued by the California Office of Safety and Health Administration.

3. Permits to cross under state highways would be issued by the California Department of Transportation.

4. Clearance for any archaeological and historical resources encountered on state lands being crossed would be necessary from the SHPO.

Contingent on state agency review; the following permits might also be necessary:

a) Water discharge permits issued by the Water Resources Control Board, Colorado River Basin Regional Board in Palm Desert, California.
b) Burning permits for any cleared material.
c) County easements to cross county drainages.
d) Excavation permits to cross county roads.
e) Easements issued by the Water Conservation District.
f) Permits to cross ditches issued by the Irrigation Districts.

## BLM and FS General Measures

The of right-of-way grant issued by the BLM and temporary use permits and operation and construction plans issued and developed by the BLM and FS would include general and specific stipulations. These measures for lands adminstered by both the BLM and FS would include, but not be limited to, the following ***general conditions***:

1. The applicant shall conduct all activities associated with the project in a manner that will avoid or minimize degradation of air, land, and water quality. In the construction, operation, maintenance, and abandonment of the project, the applicant shall perform its activities in accordance with applicable air and water quality standards, related facility siting standards, and related plans of implementation, including but not limited to, the Clean Air Act, as amended (42 USC 1321).

2. Access roads for operation and maintenance of the natural gas pipeline will be clearly identified. These access roads will ostensibly be open for public use, including but not limited to, off-road vehicular travel.

3. A transportation plan would be submitted for review and approval by the BLM and FS. This plan would cover approval of temporary, reconstructed, and newly constructed roads and would include clearing work, rehabilitation, and use associated with transportation needs. Overland access could be specified in lieu of road construction or reconstruction.

4. As a minimum, a reclamation and revegetation plan including those items described in appendix C will be required for all Federal land crossings.

5. If a natural barrier used for livestock control is broken during construction, the applicant will adequately fence the area to prevent drift of livestock. In pronghorn ranges, the fence may have to be constructed to allow for animal passage. Fence specifications would be determined on a case-by- case basis.

6. Gates or cattle guards on established roads on public land will not be locked or closed by the applicant.

7. Garbage and other refuse will be disposed in an authorized disposal site or landfill. Engine oil changed on public and National Forest lands will be contained in suitable containers and disposed as refuse; no fuel, oil, or other hydrocarbon spills are permitted. If such a spill accidentally occurs, the contaminated soil is to be excavated and the authorized officer notified immediately.

8. Permittees and other regular users of public lands and National Forest affected by construction of the project will be notified in advance of any construction activity that may affect their businesses or operations. This will include but not be limited to signing of temporary road closures, removal and/or cutting of fences, disturbances to range improvements, or other range use-related structures.

9. The applicant will meet all stipulations detailed in a Programmatic Memorandum of Agreement (PMOA) between the Advisory Council on Historic Preservation and the BLM to fulfill all Federal and state cultural resource legal requirements.

10. The applicant (RMPC) would comply with applicable Federal and state laws and regulations concerning the use of pesticides (i.e., insecticides, herbicides, fungicides, rodenticides, and other similar substances) in all activities and operations. The RMPP would obtain approval of a joint operation plan (BLM/FS) prior to the use of such substances from the BLM and/or FS Authorized Officer(s). The plan would provide the type and quantity of material to be used; the pest, insect, fungus, etc., to be controlled; the method of application; the location of storage and disposals of containers; and other information that the BLM District Manag-

ers or Forest Supervisor may require. The plan would be submitted no later than December 1 of any calendar year that covers the proposed activities for the next fiscal year (i.e., December 1, 1980, deadline for a fiscal year 1982 action). If the need for emergency use of pesticides is identified, the use would be approved by the BLM District Managers or Forest Supervisors. The use of substances on or near the rights-of-way and temporary permit areas would be in accordance with the approved plan. A pesticide would not be used if the Secretary of the Interior has prohibited its use. A pesticide would be used only in accordance with its registered uses and with other Secretarial limitations. Pesticides would not be permanently stored on Federal lands.

11. All existing improvements along facilities would be protected and damage would repaired.

12. Removal and stockpiling of topsoil would be required at all construction sites unless otherwise directed.

13. All rivers, streams, and washes would be crossed at existing roads or bridges, except at locations designated by the appropriate authorizing agency official. The applicant would be required to install culverts or bridges at points where new permanent access roads would cross live streams to allow unobstructed fish passage. Where drainages would be crossed by temporary roads, dirt fills or culverts would be placed and removed upon completion of the project. Any construction activity in a perennial stream would be prohibited unless specifically allowed by the appropriate authorizing agency official. All stream channels and washes would be returned to their natural state.

14. On areas which would be cleared of vegetation by construction or other activity associated with this project, vegetation would be reestablished under the direction of the officer in charge. Vegetation cleared during construction would be disposed per authorizing agency direction. Where commercial tree species are cut, the trees would be measured and commercially sold per direction of the FS.

15. The applicant would prepare a plan to minimize visual impacts from structures. The applicant would prepare photographic simulations of areas in which facilities are proposed within foreground-middleground areas of high scenic value or sensitivity. Using the simulation as a guide, the applicant would design and locate the pipeline route and ancillary structures to blend into the existing environment. The authorizing agency would evaluate and approve measures before construction began.

16. The applicant would be required to control noxious weeds in areas where soil surface had been modified or natural vegetation had been removed. Noxious weeds would be controlled in areas designated by FS official.

17. A fire control plan would be prepared by the applicant, and this plan would be made part of the construction and operation plan.

18. Helicopters would be used to string pipe and deliver equipment in areas where access to the terrain or management constraints preclude standard construction methods or where designated by the FS.

19. Areas subject to mudflows, landslides, mudslides, avalanches, rock falls, and other types of mass movement would be avoided where practical in locating the linear facilities. Where such avoidance is not practical, the design, based upon detailed field investigations and analysis, would provide measures to prevent the occurrence of mass movements.

20. Clearing in timbered areas to reduce fire hazard will be limited to the working space right-of-way.

21. The authorizing agency will require preclearing of mountain brush and tree-covered areas prior to dozer or maintenance blade work. Preclearing will involve handwork in cutting of brush and trees with removal by proper equipment to designated areas.

22. All topsoil on public lands and National Forest land will be conserved for reclamation requirements; excess topsoil will be stockpiled at designated locations.

23. Where possible, the right-of-way will be used as a service road during the construction period only. The authorizing agencies will require that the service roads be closed and vegetative cover reestablished. No maintenance roads along the pipeline will be permitted.

24. In public lands and National Forest land, the reestablishment of vegetative cover as well as watershed stabilization measures will have the requirement of completion during the ongoing working season and prior to the ongoing winter season.

25. On public land and National Forest land, trees and brush (indigenous species) will be established according to the revegetation and rehabilitation plan contained within the construction and operation plan.

26. The FS and BLM will direct RMPC to control off-road vehicle use along the right-of-way. Such specified control could include use of physical barriers, replanting trees, or other reasonable means of vehicle control.

27. Existing soils and geological data will be gathered and utilized to achieve maximum revegetation and soil erosion mitigation responses.

28. Construction equipment must be refueled and maintained outside of stream channels in areas designated by the authorizing agency.

## COE Prescribed Management Practices

The COE has prescribed management practices that should be followed, to the maximum extent practical, for discharges covered by the Nationwide Permit (items 1 through 8 below). Additionally, certain conditions must be met under the nationwide permit authority (items 9 through 17 below). For further detail, please refer to the COE Permit Program, "A Guide for Applicants," November 1, 1977.

1. Discharges of dredged or fill material into United States water should be avoided or minimized through the use of other practical alternatives.

2. Discharges in spawning areas during spawning seasons should be avoided.

3. Discharges should not restrict or impede the movement of aquatic species indigenous to the waters, impede the passage of normal or expected high flows, or cause the relocation of the waters (unless the primary purpose of the fill is to impound waters).

4. If the discharge creates an impoundment water, adverse impacts on the aquatic system caused by the accelerated passage of water and/or the restriction of its flow should be minimized.

5. Discharges in wetlands areas should be avoided.

6. Heavy equipment working in wetlands should be placed on mats.

7. Discharges into breeding and nesting areas for migratory waterfowl should be avoided.

8. All temporary fills should be removed in their entirety.

9. There cannot be any change in preconstruction bottom contours. (Excess material must be removed to an upland disposal area.)

10. The discharge cannot occur in the proximity of a public water supply intake.

11. The discharge cannot occur in areas of concentrated shellfish production.

12. The discharge cannot destroy a threatened or endangered species as identified under the Endangered Species Act or endanger the critical habitat of such species.

13. The discharge cannot disrupt the movement of those species of aquatic life indigenous to the waterbody.

14. The discharge must consist of suitable material free from toxic pollutants in other than trace quantities.

15. The fill created by a discharge must be properly maintained to prevent erosion and other nonpoint sources of pollution.

16. The discharge must not occur in a component of the national wild and scenic river system or in a component of a state wild and scenic river system.

17. No access roads, fills, dikes, or other structures can be constructed below the ordinary high water of the streams under the Nationwide Permit. These structures would require separate section 404 permits.

# Appendix E

# Engineering Analysis of Selected Alternatives

The general flow formula developed by the American Gas Association (AGA) was used in this analysis (AGA 1965). This formula has been incorporated into a computer program which estimates pipeline looping and compression requirements for natural gas transmission systems.

The engineering analysis considers two flow levels to calculate the facility requirements of the alternative systems. Case I assumes the 413,000 Mcfd volume proposed; Case II assumes the RMPC optimized design volume of 800,000 Mcfd. The sources and volumes of gas assumed in this analysis are as follows:

| Company | Source | Gas Volumes (Mcfd) | |
|---|---|---|---|
| | | Case I | Case II |
| Northwest | Import at Sumas, Washington | 90,000 | 90,000 |
| NGC | Red Wash Area, Colorado | 50,000 | 50,000 |
| Chevron | Big Piney, Wyoming | 151,000 | 178,000 |
| Unknown | Sage, Wyoming | 122,000 | 482,000 |
| | Totals | 413,000 | 800,000 |

These sources and volumes are based on Northwest flow diagrams and conversations with Northwest personnel (RMPC 1980a, 1980c; Fowler 1980). The Sage, Wyoming volumes were assumed to be gathered adjacent to and delivered to the Northwest pipeline at the proposed RMPP connection.

The RMPC would construct 610 miles of 36-inch diameter pipeline to transport 413,000 Mcfd. This analysis compares the RMPP to six alternatives. It does not analyze the additional fuel gas, pipeline, and compression facilities that might be required on Northwest's system to implement the RMPP for either Case I or Case II. Additional Northwest facilities may be necessary to transport El Paso's and Northwest's 90,000 Mcfd of 'committed' RMPP gas from Sumas, Washington, to Sage, Wyoming. The applicant has indicated that additional facilities might be required on Northwest's system only for the 800,000-Mcfd level. These additional facilities consist of approximately 63 miles of 24-inch and 19 miles of 36-inch diameter looping and 15,230 hp. of compression on Northwest's system north of Sage, Wyoming. The additional compression on Northwest's system would be installed at existing stations.

Since the applicant has not identified either the sources or the exact volumes of gas that each source would supply to the RMPP for either the 413,000- or 800,000-Mcfd levels, it is not possible to establish the exact alternative facility requirements on Northwest's system that would be required to deliver gas to the Sage Compressor Station for the RMPP. The identified facilities are only one possibility for a hypothetical supply situation. At this time, Northwest's specific requirements are not known.

Tables E-1 and E-2 compare the alternative transportation systems to the RMPP.

TABLE E-1.

COMPARISON OF RMPP ALTERNATIVE TRANSPORTATION SYSTEMS: CASE I

| Facilities | RMPP | [a]Northern Systems (42-Inch) | | | | Northwest/El Paso | | | North-South (42-Inch) | | | Central Nevada | West Salt Lake | Northwest/PGT/PG&E (36-Inch) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Northwest | PGT | PG&E | Total | North-west | El Paso | Total | North-west PGT/ PG&E | Northwest El Paso | Total | | | North-west | PGT | PG&E | Total |
| System Length (Miles) | 610 | 583 | 335 | [b]296 | 1,214 | 500 | 480 | 980 | 1,214 | 980 | 2,194 | 862 | 719 | 583 | 335 | 296 | 1,214 |
| Miles of New Pipe (36-Inch) | 610 | 76.8 | -- | [c]148 | 225.1 | 413 | 320 | 733 | [c]148 | 388 | 536 | 862 | 719 | 77 | 236 | 340 | 653 |
| Additional Compression (Horsepower) | 21,200 | 400 | 12,750 [d](2,450) | 8,450 (5,200) | 21,600 (8,050) | 350 | 8,000 | 8,350 | 6,450 (2,070) | 3,820 | 10,270 (5,890) | 25,650 | 23,350 | 400 | -- | -- | 400 |
| Incremental Fuel (Million Cfd) | 2.91 | 7.06 | 13.79 (8.66) | 6.93 (4.68) | 27.78 (20.22) | 5.94 | 17.06 | 23.00 | 9.32 (6.25) | 13.44 | 22.76 (19.69) | 3.52 | 3.20 | 7.06 | 6.09 | 3.84 | 16.99 |

[a]Western Leg completed.

[b]This number represents only the distance from the Oregon-California border to Antioch, California.

[c]PG&E and SoCal pipeline facilities south of Antioch, California (the Brentwood-Panoche Junction and Hinkley-Adelanto pipelines).

[d]The values in parentheses indicate facility and fuel requirements if a 48-inch diameter Western Leg were constructed instead of a 42-inch diameter system.

TABLE E-2

COMPARISON OF RMPP TO ALTERNATIVE TRANSPORTATION SYSTEMS: CASE II

| Facilities | RMPP | [a]Northern Systems (42-Inch) | | | | Northwest/El Paso | | | North-South (42-Inch) | | | Central Nevada | West Salt Lake | Northwest/PGT/PG&E (36-Inch) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | North-west | PGT | PG&E | Total | Northwest | El Paso | Total | Northwest PGT/PG&E | North-west El Paso | Total | | | North-west | PGT | PG&E | Total |
| System Length (Miles) | 610 | 583 | 335 | [b]296 | 1,214 | 500 | 480 | 980 | 1,214 | 980 | 2,194 | 862 | 719 | 583 | 335 | 296 | 1,214 |
| Miles of New Pipe (36-Inch) | 610 | 390 | -- | [c]148 | 538 | 496 | 538 | 1,034 | 225 | 733 | 958 | 862 | 719 | 390 | 318 | 444 | 1,152 |
| Additional Compression (Horsepower) | 84,800 | 8,900 | [d]84,020 (18,775) | 40,930 (13,025) | 133,850 (40,700) | 49,700 | 17,200 | 66,900 | 21,600 (8,050) | 8,350 | 29,950 (16,400) | 120,200 | 99,450 | 8,900 | 15,700 | 6,850 | 31,450 |
| Incremental Fuel (Million Cfd) | 11.56 | 12.08 | 34.45 (20.75) | 17.03 (10.86) | 63.56 (43.51) | 17.34 | 18.08 | 35.42 | 27.62 (20.22) | 23.0 | 50.62 (43.22) | 16.54 | 13.61 | 12.08 | 10.24 | 5.56 | 27.88 |

[a]Western Leg completed.

[b]This number represents only the distance from the Oregon-California border to Antioch, California.

[c]PG&E and SoCal pipeline facilities south of Antioch, California.

[d]The values in parentheses indicate facility and fuel requirements if a 48-inch diameter Western Leg were constructed instead of a 42-inch diameter system.

## NORTHERN SYSTEMS ALTERNATIVE

The engineering analysis for the Northern Systems Alternative examines staged facility requirements for the alternative. First, the requirements on Northwest's system were determined. Then requirements for PGT's and PG&E's systems were analyzed assuming both a prebuilt and a fully completed Western Leg.

The facility requirements estimated for Northwest's system use winter conditions as the worst case because these conditions would require the maximum pipeline facilities. This analysis includes all existing and certificated facilities on Northwest's system as the base case and assumes that 36-inch diameter pipe would be used for all looping. The results of this analysis for Northwest are presented in table E-3.

TABLE E-3

FACILITY REQUIREMENTS ON NORTHWEST SYSTEM FOR NORTHERN SYSTEMS ALTERNATIVE

| Compressor Station | MP | Additional Compression (Horsepower) | | Total Looping (Miles) | |
|---|---|---|---|---|---|
| | | Case I | Case II | Case I | Case II |
| Kemmerer | 0.0 | --- | --- | 21.7 | 32.8 |
| Pegram | 33.5 | --- | --- | 7.0 | 31.8 |
| Soda Springs | 66.4 | --- | --- | 22.8 | 36.4 |
| Lava Hot | 102.8 | --- | 2,100 | --- | 37.8 |
| Pocatello | 142.9 | --- | --- | 25.3 | 74.9 |
| Burley | 217.8 | --- | 1,950 | --- | 84.8 |
| Mt. Home | 302.6 | --- | 400 | --- | 32.2 |
| Caldwell | 385.4 | --- | --- | --- | 59.3 |
| Baker | 485.6 | --- | --- | --- | --- |
| [a]Stanfield | 583.6 | 400 | 4,450 | --- | --- |
| TOTALS | ..... | 400 | 8,900 | 76.8 | 390.0 |

[a]This would be a new compressor station.

The existing PGT transmission system is designed to transport 1,028,000 Mcfd south from Stanfield, Oregon, and to deliver 980,000 Mcfd to PG&E at the Oregon-California border. PG&E's transmission system then carries the gas farther south to its market area. This system was used as the base case for the analysis. The facility requirements south of Antioch, California, were not analyzed. The applicant has indicated that a 120-mile long pipeline between Brentwood and Panoche Junction and a 28.3-mile long pipeline between Hinkley and Adelanto might be required. These facilities have been added into the totals as a worst-case possibility. If any facilities south of Antioch were required, the CPUC would have to authorize their construction and operation.

Two flow scenarios were considered to determine facility needs on PGT's and PG&E's systems. Each scenario examines both 42- and 48-inch diameter looping.

The first scenario examines the incremental expansion of the Western Leg to transport RMPP gas. This would be equivalent to 'prebuilding' portions of the Western Leg to transport RMPP gas before Alaskan gas starts to flow. The looping mileage, incremental fuel consumption, and compression facilities required for this scenario are shown in table E-4. The location of the "prebuilt" pipeline looping is shown in table E-5.

The second scenario assumes that the PGT and PG&E systems (631 miles) have been completely looped (i.e., the Western Leg has been completed). The incremental fuel and additional compression facilities required on these systems for a range of flow levels are shown in table E-6. This table shows how fuel use on the Western Leg would be affected by an increase from the base flow (0 Mcfd is equivalent to 1,028,000 Mcfd at Stanfield) to 1,440,000 Mcfd, the volume which includes both the Alaskan gas volume of 640,000 Mcfd and the maximum RMPP volume of 800,000 Mcfd. The location of the additional compression for this scenario is shown on table E-5.

Table E-7 shows the total facility requirements for the Northern Systems Alternative if sections of the Western Leg are prebuilt. If the Western Leg is never completed, the totals in this table would represent the requirements of this alternative.

Table E-8 identifies the alternative's looping, compression, and fuel requirements if the Western Leg has been completed. However, although the facilities required for the Western Leg are an integral part of the engineering analysis, they should not be considered in comparing the Northern Systems Alternative to the RMPP, since those facilities will be constructed regardless of the Northern Systems Alternative.

Natural gas imports from Canada provide a significant portion of the gas consumed on the west coast. The authorized Canadian import volumes from 1980 to 1993 are shown in table E-9. These volumes are subject to minor delivery reductions as early as 1982. If these contract licenses expire, PGT and PG&E would suffer a serious loss of gas supply and proportionately increased capacity on their northern transmission systems. The Northern

# APPENDIX E--ENGINEERING ANALYSIS OF SELECTED ALTERNATIVES

Systems Alternative analysis assumes that the Canadian import volumes would remain constant at the 1980 volume (1,219,000 Mcfd).

TABLE E-4

FLOW SCENARIO I: PGT/PG&E FACILITY REQUIREMENTS

| Size | Incremental Flow (Million Cfd) | Looping (Miles) | Incremental Fuel (Million Cfd) | Incremental Horsepower |
|---|---|---|---|---|
| 42-Inch Diameter Pipeline | 200 | 180 | 10.00 | - |
| | 413 | 380 | 10.10 | - |
| | 640 | 516 | 10.05 | 100 |
| | 800 | 565 | 11.35 | 4,550 |
| | 1,053 | 613 | 15.41 | 21,500 |
| | 1,440 | 630 | 41.80 | 125,250 |
| 48-Inch Diameter Pipeline | 200 | 170 | 9.99 | - |
| | 413 | 350 | 10.12 | - |
| | 640 | 476 | 10.03 | - |
| | 800 | 534 | 10.25 | 600 |
| | 1,053 | 582 | 11.76 | 7,350 |
| | 1,440 | 621 | 17.78 | 31,800 |

Note: Base flow = 1,028 million cfd at Stanfield Base fuel - 34.49 million cfd

TABLE E-5

PGT AND PG&E FACILITY REQUIREMENTS FOR THE NORTHERN SYSTEMS ALTERNATIVE

| | Compressor Station | MP | [a]42-Inch Prebuilt Western Leg | | | | 48-Inch Prebuilt Western Leg | | | | 42-Inch Completed Western Leg | | 48-Inch Completed Western Leg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Additional Compression (Horsepower) | | Total Looping (Miles) | | Additional Compression (Horsepower) | | Total Looping (Miles) | | Additional Compression (Horsepower) | | Additional Compression (Horsepower) | |
| | | | Case I | Case II | Case I | Case II | Case I | Case II | Case I | Case II | Case I | Case II | Case I | Case II |
| PGT | [b]Stanfield | 0.0 | -- | -- | 34.0 | 42.1 | -- | -- | 32.1 | 40.9 | -- | -- | -- | -- |
| | Ione | 42.1 | -- | 1,560 | 25.3 | 41.3 | -- | -- | 24.0 | 38.8 | 8,925 | 24,500 | 2,450 | 12,300 |
| | Kent | 90.9 | -- | -- | 40.4 | 53.7 | -- | -- | 37.9 | 50.2 | -- | 7,250 | -- | -- |
| | Madras | 147.7 | -- | -- | 27.9 | 42.6 | -- | -- | 26.0 | 39.8 | 1,450 | 14,650 | -- | 2,125 |
| | Paulina | 195.4 | -- | -- | 31.0 | 48.6 | -- | -- | 29.1 | 45.7 | -- | 11,200 | -- | 500 |
| | Diamond Junction | 252.1 | -- | -- | 48.5 | 65.9 | -- | -- | 40.0 | 62.5 | -- | 8,000 | -- | -- |
| | Bonanza | 321.8 | -- | -- | [c]21.3 | 33.5 | -- | -- | 20.1 | 31.6 | 2,375 | 18,420 | -- | 3,850 |
| | | Subtotal | -- | 1,560 | 228.4 | 327.7 | -- | -- | 209.2 | 309.5 | 12,750 | 84,020 | 2,450 | 18,775 |
| PG&E | Tionesta | 359.7 | -- | -- | 30.2 | 48.9 | -- | -- | 28.3 | 45.8 | -- | 5,250 | -- | -- |
| | Burney | 417.4 | -- | -- | 38.2 | 59.2 | -- | -- | 34.5 | 54.5 | -- | 7,250 | -- | -- |
| | Gerber | 484.0 | -- | -- | 27.1 | 48.6 | -- | -- | 25. 2 | 48.6 | -- | 9,450 | -- | -- |
| | Delevan | 532.6 | -- | 2,975 | 56.1 | 80.4 | -- | 600 | 52.3 | 75.8 | 8,450 | 18,980 | 5,200 | 13,025 |
| | Antioch | 631.2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | Subtotal | -- | 2,975 | 151.6 | 237.1 | -- | 600 | 140.3 | 224.7 | 8,450 | 40,930 | 5,200 | 13,025 |

[a]All looping begins on the discharge side of the indicated compressor station.

[b]Location of interconnection of Northwest and PGT transmission systems.

[c]This looping starts on the discharge side of the Bonanza Compressor Station and would continue into California. Therefore, part of the looping would be on PG&E's system.

| Incremental Flow (Million Cfd) | 42-Inch Diameter Pipeline | | 48-Inch Diameter Pipeline | |
|---|---|---|---|---|
| | Incremental Fuel (Million Cfd) | Incremental Horsepower | Incremental Fuel (Million Cfd) | Incremental Horsepower |

## TABLE E-6

## FLOW SCENARIO II: PGT/PG&E FACILITY REQUIREMENTS

| Incremental Flow (Million Cfd) | 42-Inch Diameter Pipeline | | 48-Inch Diameter Pipeline | |
|---|---|---|---|---|
| | Incremental Fuel (Million Cfd) | Incremental Horsepower | Incremental Fuel (Million Cfd) | Incremental Horsepower |
| 0 | [a]-26.58 | - | -28.14 | - |
| 100 | -24.86 | - | -26.78 | - |
| 200 | -22.87 | - | -25.39 | - |
| 300 | -20.56 | - | -23.80 | - |
| 400 | -17.90 | - | -22.01 | - |
| 413 | -17.52 | - | -21.76 | - |
| 500 | -14.65 | - | -19.99 | - |
| 600 | -11.19 | - | -17.72 | - |
| 640 | -9.68 | 300 | -16.73 | - |
| 700 | -7.27 | 1,400 | -15.16 | - |
| 800 | -2.83 | 4,850 | -12.31 | 750 |
| 900 | 2.17 | 9,600 | -8.90 | 2,550 |
| 1,000 | 7.80 | 15,550 | -5.39 | 5,550 |
| 1,053 | 11.06 | 21,500 | -3.39 | 7,650 |
| 1,100 | 14.12 | 27,050 | -1.52 | 9,550 |
| 1,200 | 21.20 | 45,250 | 2.76 | 13,800 |
| 1,300 | 29.12 | 74,500 | 7.47 | 18,500 |
| 1,440 | 41.80 | 125,250 | 14.88 | 31,800 |

Note: Base flow = 1,028 Million Cfd (at Stanfield) Base fuel = 34.49 Million Cfd

[a]Negative figures represent a fuel savings over the base fuel requirements.

## TABLE E-7

## FLOW SCENARIO I: NORTHERN SYSTEMS ALTERNATIVE (PREBUILT WESTERN LEG)

| Facilities | 42-Inch Diameter Pipeline | | 48-Inch Diameter Pipeline | |
|---|---|---|---|---|
| | Case I | Case II | Case I | Case II |
| Miles of New Pipe | | | | |
| Northwest, 36-Inch | 77 | 390 | 77 | 390 |

## TABLE E-7—Continued

| Facilities | 42-Inch Diameter Pipeline | | 48-Inch Diameter Pipeline | |
|---|---|---|---|---|
| | Case I | Case II | Case I | Case II |
| PGT | 228.4 | 327.7 | 209.2 | 309.5 |
| PG&E | 151.6 | 237.1 | 140.3 | 224.7 |
| [a]PG&E/SoCal, 36-Inch | 148 | 148 | 148 | 148 |
| Total | 605 | 1,103 | 575 | 1,072 |
| Additional Compression (Horsepower) | | | | |
| Northwest | 400 | 8,900 | 400 | 8,900 |
| PGT | - | 1,560 | - | - |
| PG&E | - | 2,975 | - | 600 |
| Total | 400 | 13,435 | 400 | 9,500 |
| Operational Fuel Increase (million cfd) | | | | |
| Northwest | 7.06 | 12.08 | 7.06 | 12.08 |
| PGT | 6.25 | 6.69 | 6.23 | 6.22 |
| PG&E | 3.85 | 4.66 | 3.89 | 4.03 |
| Total Incremental Fuel (Million Cfd) | 17.16 | 23.43 | 17.18 | 22.33 |

[a]Facilities south of Antioch, California: PG&E--120 miles of new pipeline from Brentwood to Panoche Junction; SoCal--28.3 miles of looping between Hinkley and Adelanto.

## TABLE E-8

## FLOW SCENARIO II: NORTHERN SYSTEMS ALTERNATIVE (COMPLETED WESTERN LEG)

| Facilities | 42-Inch Diameter Pipeline | | 48-Inch Diameter Pipeline | |
|---|---|---|---|---|
| | Case I | Case II | Case I | Case II |
| Miles of New Pipe | | | | |
| Northwest, 36-Inch | 77 | 390 | 77 | 390 |
| PGT | -- | -- | -- | -- |
| PG&E | -- | -- | -- | -- |
| [a]PG&E/SoCal, 36-Inch | 148 | 148 | 148 | 148 |
| Total | 225 | 538 | 225 | 538 |
| Additional Compression (Horsepower) | | | | |
| Northwest | 400 | 8,900 | 400 | 8,900 |
| PGT | 12,750 | 84,020 | 2,450 | 18,775 |
| PG&E | 8,450 | 40,930 | 5,200 | 13,025 |
| Total | 21,600 | 133,850 | 8,050 | 40,700 |
| Operational Fuel Increase (Million Cfd) | | | | |
| Northwest | 7.06 | 12.08 | 7.06 | 12.08 |
| PGT | 13.79 | 34.45 | 8.66 | 20.75 |
| PG&E | 6.93 | 17.03 | 4.68 | 10.86 |
| Total Incremental Fuel (Million Cfd) | 27.78 | 63.56 | 20.22 | 43.51 |

[a]Facilities south of Antioch, California: PG&E--120 miles of new pipeline from Brentwood to Panoche Junction; SoCal--28.3 miles of looping between Hinkley and Adelanto.

TABLE E-9

AUTHORIZED NATURAL GAS IMPORTS FROM CANADA (Million Cfd)

| Importing Company | 1980 After July 1 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [a]PGT GL-3 | 429 | 429 | 429 | 429 | 429 | 429 | 353 | 87 | | | | | | |
| PGT GL-16 | 231 | 231 | 214 | 210 | 210 | 210 | 210 | 210 | 184 | | | | | |
| PGT GL-24 | 224 | 224 | 218 | 218 | 218 | 218 | 218 | 218 | 218 | 218 | 218 | 199 | 125 | 103 |
| PGT GL-35 | 189 | 189 | 189 | 189 | 189 | 171 | 85 | 38 | | | | | | |
| Subtotal | 1,073 | 1,073 | 1,050 | 1,046 | 1,046 | 1,028 | 866 | 553 | 402 | 218 | 218 | 199 | 125 | 103 |
| PGT/NW GL-4 | 146 | 146 | 140 | 140 | 140 | 105 | 70 | 34 | | | | | | |
| Total | 1,219 | 1,219 | 1,190 | 1,186 | 1,186 | 1,133 | 936 | 587 | 402 | 218 | 218 | 199 | 125 | 103 |

[a]"GL-3" and similar designations identify the contracts for these gas volumes.

## NORTHWEST/PGT/PG&E ALTERNATIVE

The basis for the flow analysis of the Northwest/PGT/PG&E Alternative is the same as that used for the Northern Systems Alternative, except that the pipeline expansion for this alternative considers only 36-inch diameter looping for all three transmission systems. The looping mileage, incremental fuel consumption, and compression facilities for Case I (413,000 Mcfd) are shown in table E-1 and for Case II (800,000 Mcfd) in table E-2. These facilities would include a new compressor station at Stanfield, Oregon, for both cases. All other additional compression requirements would be added at existing compressor stations.

This alternative does not consider Alaskan gas volumes. The facilities shown in tables E-1 and E-2 would be required to transport the RMPP gas volumes and thus, are not part of the Western Leg facilities. When the Alaskan gas volumes become available, the Western Leg would be required in addition to these facilities.

## NORTHWEST/EL PASO ALTERNATIVE

The facility requirements for the Northwest/El Paso Alternative are based on existing system requirements to deliver 410,000 Mcfd--the volume of Northwest's firm transportation agreements with other interstate pipeline companies--to the Ignacio (Colorado) Compressor Station. (See table E-10 for the increments of this volume.) In order to transport the base volume, this analysis for the Northwest system also includes a new 3,730-hp. Cortez Compressor Station, located approximately half the distance between the existing Moab and Ignacio Compressor Stations. This facility has not been proposed nor authorized and would have to be constructed for Northwest to transport 410,000 Mcfd. The base case for this analysis also includes all existing and certificated facilities on this system.

The facility estimates calculated for the Northwest system used summer conditions as the worst case. El Paso's facility estimates were based on winter conditions.

The facility requirements for the Northwest/El Paso Alternative are shown in tables E-1 and E-2 for Case I (413,000 Mcfd) and Case II (800,000 Mcfd), respectively. A 36-inch diameter pipe was assumed for all pipeline looping in this alternative. The facility requirements for Case II include a new 15,500- hp.

Cisco Compressor Station between the existing Rangely and Moab Compressor Stations on the Northwest system. All other additional compression for this alternative would be located at existing sites.

TABLE E-10

NORTHWEST'S FIRM TRANSPORTATION AGREEMENTS WITH REDELIVERY TO EL PASO AT IGNACIO, COLORADO

| FERC Docket No. | Status | Transporting For | From | Volume (Mcfd) |
|---|---|---|---|---|
| CP78-119... | Ordered: 7/18/79 | Michigan-Wisconsin Pipeline Co. | Creston Nose, WY | 15,000 |
| CP78-165... | Ordered: 7/18/79 | Michigan-Wisconsin Pipeline Co. | Lincoln Road, WY | 10,000 |
| CP78-183... | Ordered: 4/17/79 | Natural Gas Pipeline Co. of America | Bar X Field, UT | 25,000 |
| CP79-56.... | [a]Ordered: 1/11/80 | PIT | Stanfield, OR | 240,000 |
| CP78-546, CP78-547. | Ordered: 4/5/78 | Southwest | Grand and Uintah Counties, UT. | 6,000 |
| CP78-546... | Ordered: 11/9/79 | Southwest | Garfield and Mesa Counties, CO. | 14,000 |
| CP79-115... | Ordered: 8/9/79 | Cities | Moxa Arch Area, WY | 100,000 |
| | | | TOTAL | 410,000 |

[a]Appeal pending.

## NORTH/SOUTH ALTERNATIVE

The North/South Alternative would conceptually split the gas volume proposed for transportation by the RMPP into two equal flows, sending half of the gas north to Stanfield and the other half south toward El Paso's system. Case I would send 200,000 Mcfd in each direction; Case II would send 400,000 Mcfd each way. The facility requirements for this alternative are shown in tables E-11 and E-12. Table E-11 represents the facility requirements if the Western Leg has not been completed; table E-12 assumes the Western Leg has been completed. Since a 42-inch diameter pipe size has been selected for the Western Leg by former Secretary of Energy, Charles Duncan, table E-12 does not consider a 36-inch diameter pipeline.

The facility estimates for this alternative were calculated using the same assumptions as those for the Northern Systems, Northwest/El Paso, and Northwest/PGT/PG&E Alternatives.

TABLE E-11

FLOW SCENARIO I: NORTH/SOUTH ALTERNATIVE

| Facilities | 36-Inch Diameter Pipeline | | 42-Inch Diameter Pipeline | | 48-Inch Diameter Pipeline | |
|---|---|---|---|---|---|---|
| | Case I | Case II | Case I | Case II | Case I | Case II |
| **Miles of New Pipe** | | | | | | |
| Northwest (36-Inch) | [a]227 | [b]490 | 227 | 490 | 227 | 490 |
| El Paso (36-Inch) | 161 | 320 | 161 | 320 | 161 | 320 |
| PGT | 200 | 236 | 180 | 207 | 170 | 191 |
| PG&E | | 192 | | 173 | | 159 |
| [c]PG&E/SoCal (36-Inch) | 148 | 148 | 148 | 148 | 148 | 148 |
| Total | 736 | 1,386 | 716 | 1,338 | 706 | 1,308 |
| **Additional Compression (hp)** | | | | | | |
| Northwest | - | 750 | - | 750 | - | 750 |
| El Paso | 3,820 | 8,000 | 3,820 | 8,000 | 3.820 | 8,000 |
| PGT | - | - | - | - | - | - |
| PG&E | - | - | - | - | - | - |
| Total | 3,820 | 8,750 | 3,820 | 8,750 | 3,820 | 8,750 |
| **Operational Fuel Increase (Million Cfd)** | | | | | | |

TABLE E-11—Continued

| Facilities | 36-Inch Diameter Pipeline | | 42-Inch Diameter Pipeline | | 48-Inch Diameter Pipeline | |
|---|---|---|---|---|---|---|
| | Case I | Case II | Case I | Case II | Case I | Case II |
| Northwest | 2.85 | 13.00 | 2.85 | 13.00 | 2.85 | 13.00 |
| El Paso | 11.06 | 17.06 | 11.06 | 17.06 | 11.06 | 17.06 |
| PGT | 10.03 | 6.09 | 10.00 | 6.25 | 9.99 | 6.23 |
| PG&E | | 3.84 | | 3.85 | | 3.89 |
| Total Incremental Fuel (Million Cfd) | 23.94 | 39.99 | 23.91 | 40.16 | 23.90 | 40.18 |

[a]No pipeline looping is required north of Kemmerer, Wyoming because this volume of gas could be exchanged for an equal amount of Pan Alberta gas, authorized in FERC Docket No. CP79-56. No compression would be needed.

[b]North of Kemmerer, Wyoming, 77 miles of pipeline would be required.

[c]Facilities south of Antioch, California: PG&E--120 miles of new pipeline from Brentwood to Panoche Junction; SoCal--28.3 miles of looping between Hinkley and Adelanto.

TABLE E-12

FLOW SCENARIO II: NORTH/SOUTH ALTERNATIVE

| Facilities | 42-Inch Diameter Pipeline | | 48-Inch Diameter Pipeline | |
|---|---|---|---|---|
| | Case I | Case II | Case I | Case II |
| **Miles of New Pipe** | | | | |
| Northwest (36-Inch) | 227 | 490 | 227 | 490 |
| El Paso (36-Inch) | 161 | 320 | 161 | 320 |
| PGT | | | | |
| PG&E | | | | |
| [a]PG&E/SoCal (36-Inch) | 148 | 148 | 148 | 148 |
| Total | 536 | 958 | 536 | 958 |
| **Additional Compression (Horsepower)** | | | | |
| Northwest | -- | 750 | -- | 750 |
| El Paso | 3,820 | 8,000 | 3,820 | 8,000 |
| PGT | 6,450 | 12,750 | 2,070 | 2,450 |
| PG&E | -- | 8,450 | -- | 5,200 |
| Total | 10,270 | 29,950 | 5,890 | 16,400 |
| **Operational Fuel Increase (Million Cfd)** | | | | |
| Northwest | 2.85 | 13.00 | 2.85 | 13.00 |
| El Paso | 11.06 | 17.06 | 11.06 | 17.06 |
| PGT | 8.85 | 13.79 | 5.78 | 8.66 |
| PG&E | -- | 6.77 | -- | 4.50 |
| **Total Incremental Fuel (Million Cfd)** | 22.76 | 50.62 | 19.69 | 43.22 |

[a]Facilities south of Antioch, California: PG&E--120 miles of new pipeline from Brentwood to Panoche Junction; SoCal--28.3 miles of looping between Hinkley and Adelanto.

## CENTRAL NEVADA ALTERNATIVE

The Central Nevada Alternative would require approximately 862 miles of 36- inch diameter pipeline. It would originate at Sage, Wyoming, and follow the proposed RMPP route south approximately 196 miles. It would then proceed approximately 666 miles across central Nevada and California, eventually connecting with two existing intrastate pipelines in California-- PG&E's pipeline about 30 miles west of Barstow and SoCal's pipeline near Victorville. (See the *Graphic Supplement* for a map showing this alternative.)

Analysis indicates that one new compressor station would be needed to transport the initial 413,000 Mcfd of RMPP gas. Three additional booster compressor stations and an enlarged Sage Compressor Station would be required to transport 800,000 Mcfd. The design and operation of the alternative pipeline is assumed to be equivalent to that of the proposed RMPP; therefore, the same gas receipt

and delivery pressures and maximum allowable operating pressure were used as design parameters. The compression requirements, milepost locations, and fuel consumption for Case I (413,000 Mcfd) and Case II (800,000 Mcfd) are shown in table E-13. The location of the booster compressor station sites are preliminary.

This analysis has examined only the facility needs between Sage, Wyoming, and the delivery point in California.

## WEST SALT LAKE ALTERNATIVE

The West Salt Lake Alternative would require the construction of the Kemmerer and Pegram Loops of the Northern Systems Alternative. It would also require construction of approximately 719 miles of 36-inch diameter pipeline. This pipeline would begin at the Northwest system approximately 15 miles north of the existing Pegram Compressor Station. It would follow a meandering southerly route which would bypass the Great Salt Lake to the north and west. It would proceed approximately 363 miles to the RMPP route near Filmore, Utah, then follow the RMPP route approximately 356 miles to southern California. (See the *Graphic Supplement* for a map showing this alternative.)

Analysis indicates that a new compressor station, Montpelier, located where this alternative departed from Northwest's transmission system, would be required to transport the initial 413,000 Mcfd of RMPP gas. Three additional booster compressor stations and an enlarged Montpelier Compressor Station would be required to transport 800,000 Mcfd. Since the design and operation of the alternative pipeline is assumed to be equivalent to that of the proposed RMPP, the same gas receipt and delivery pressures and maximum allowable operating pressure were used as design parameters. The compression requirements, milepost locations, and fuel consumption for Case I (413,000 Mcfd) and Case II (800,000 Mcfd) are shown in table E-14. The locations of the booster compressor station sites are preliminary.

This analysis examines only the facility needs between the Northwest pipeline system and the delivery point in California.

TABLE E-13

COMPRESSION REQUIREMENTS FOR CENTRAL NEVADA ALTERNATIVE

| Volume | Description | MP | Volume of Gas Compressed (Million Cfd) | Required Horse-power | Fuel Gas (Million Cfd) |
|---|---|---|---|---|---|
| Case I: 413,000 Mcfd | Sage Compressor Station | 0.0 | 409.5 | 25,650 | 3.52 |
| Case II: 800,000 Mcfd | Sage Compressor Station | 0.0 | 793.0 | 52,400 | 7.02 |
| | Station No. 1 | 210.0 | 789.8 | 22,850 | 3.21 |
| | Station No. 2 | 420.0 | 786.2 | 25,650 | 3.60 |
| | Station No. 3 | 614.0 | 783.5 | 19,300 | 2.71 |
| TOTALS | | | | 120,200 | 16.54 |

# APPENDIX E--ENGINEERING ANALYSIS OF SELECTED ALTERNATIVES

## TABLE E-14

## COMPRESSION REQUIREMENTS FOR WEST SALT LAKE ALTERNATIVE

| Volume | Description | MP | Volume of Gas Compressed (Million Cfd) | Required Horsepower | Fuel Gas (Million Cfd) |
|---|---|---|---|---|---|
| Case I: 413,000 Mcfd | Montpelier Compressor Station | [a]0.0 | 409.8 | 23,350 | 3.20 |
| Case II: 800,000 Mcfd | Montpelier Compressor Station | [a]0.0 | 793.0 | 52,400 | 7.02 |
| | Station No. 1 | 190.2 | 790.4 | 18,800 | 2.63 |
| | Station No. 2 | 380.2 | 787.7 | 19,200 | 2.69 |
| | Station No. 3 | 570.2 | 786.4 | 9,050 | 1.27 |
| TOTALS | | | | 99,450 | 13.61 |

[a]MP 0 is located where the alternative would leave the Northwest transmission system.

# Appendix F

# Alternatives Considered but Eliminated from Detailed Study

## TOTAL SYSTEM ALTERNATIVES

The six total project/system alternatives which were considered but eliminated from detailed consideration would use existing pipeline systems and routes and might also establish new pipeline alignments. These alternatives, shown on map F-1, include the Northwest/Southwest (ABCIJFGHNO), Northern Route (AIEFGHNO), Northern Route and Southwest Gas (AIJGHNO), Northwest/El Paso (AKLM), Northwest/PGT/PG&E (ABCDEFGHNO), and North-South Alternatives (ABCDEFGHNO and AKLM). Table F-1 compares the length of these alternatives to the RMPP at the proposed volume of 413,000 Mcfd. The amount of compressor fuel gas was not determined for the Northwest/Southwest, Northern Route, and Northern Route and Southwest Gas Alternatives. Since these alternatives would require longer pipeline construction than the proposed route without introducing any significant environmental advantages, the analysis of these three alternatives was limited primary to environmental impact.

In addition to primary environmental impact, the Northwest/El Paso, Northwest/PGT/PG&E, and North-South Alternatives were analyzed for operational effects of fuel use. A more detailed discussion of the engineering aspects of these systems can be found in appendix E.

TABLE F-1

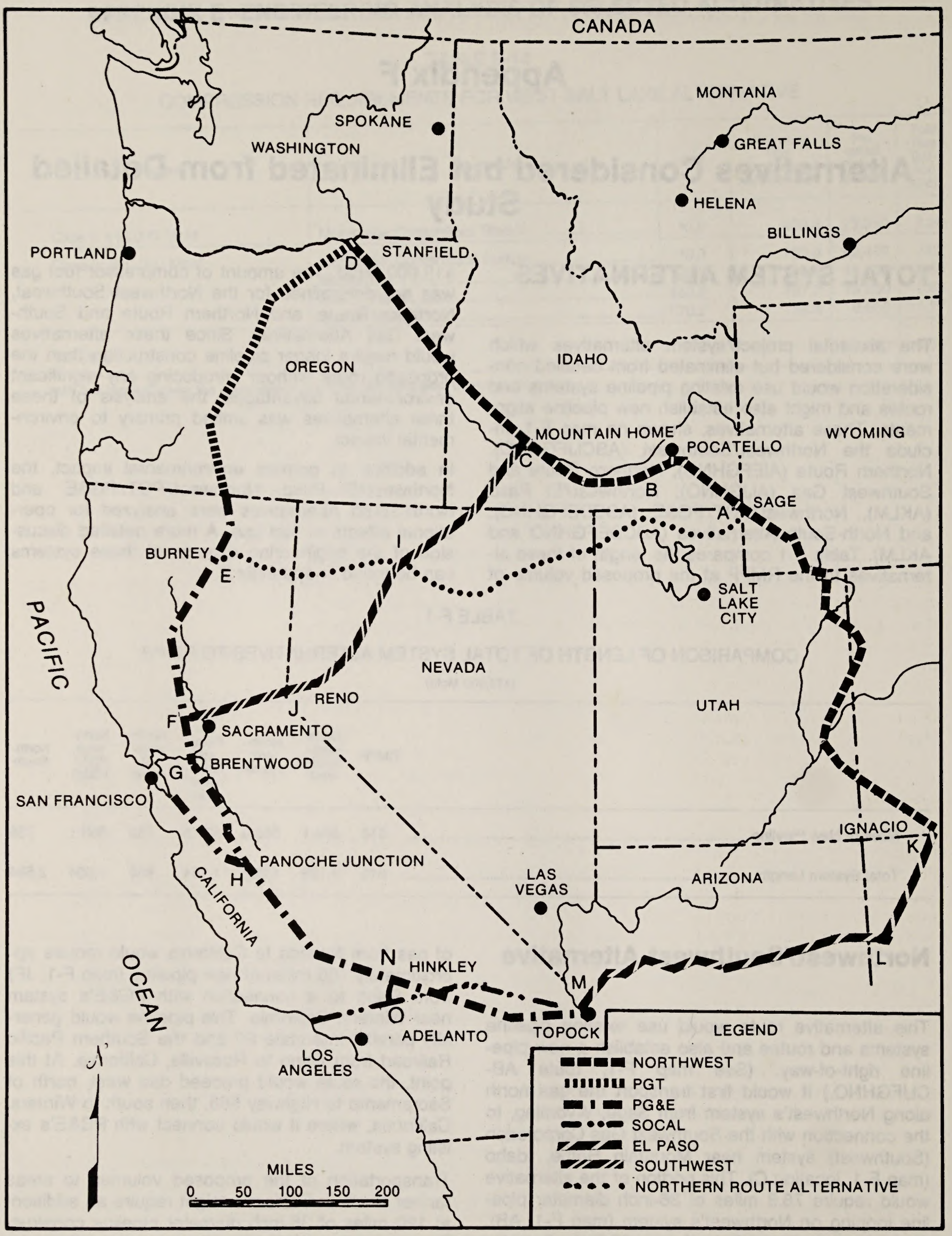
COMPARISON OF LENGTH OF TOTAL SYSTEM ALTERNATIVES TO RMPP
(413,000 Mcfd)

| | RMPP | Northwest/ Southwest | Northern Route | Northern Route and Southwest Gas | Northwest/ El Paso | Northwest PGT/ PG&E | North-South |
|---|---|---|---|---|---|---|---|
| Miles of New Pipeline | 610 | 694.1 | 893.3 | 871.3 | 733 | 653.1 | 736 |
| Total System Length | 610 | 1,195 | 1,222 | 1,154 | 980 | 1,604 | 2,584 |

## Northwest/Southwest Alternative

This alternative route would use existing pipeline systems and routes and also establish a new pipeline right-of-way. (See map F-1, route ABCIJFGHNO.) It would first transport the gas north along Northwest's system from Sage, Wyoming, to the connection with the Southwest Gas Corporation (Southwest) system near Mountain Home, Idaho (map F-1, location C). This portion of the alternative would require 76.8 miles of 36-inch diameter pipeline looping on Northwest's system (map F-1, AB). Approximately 303 miles of new 36-inch diameter pipeline would then be constructed parallel to Southwest's existing system (map F-1 CIJ) from Mountain Home to Reno, Nevada. Transportation of gas from Nevada to California would require approximately 166 miles of new pipeline (map F-1, JF) from Reno to a connection with PG&E's system near Winters, California. This pipeline would generally parallel Interstate 80 and the Southern Pacific Railroad from Reno to Rossville, California. At this point, the route would proceed due west, north of Sacramento to Highway 565, then south to Winters, California, where it would connect with PG&E's existing system.

Transportation of the proposed volumes to areas farther south in California might require an additional 120 miles of 36-inch diameter pipeline construction (map F-1, GH) from Brentwood to Panoche Junction on PG&E's southern system and 28.3 miles of 36-inch diameter pipeline construction between Hinkley and Adelanto, California (map F-1,




MAP F-1. ALTERNATIVE PIPELINE CORRIDORS

NO) to connect PG&E's system with SoCal's system. However, in its November 12, 1980, data response discussed in relation to the Northern Systems Alternative, the applicant does not definitely state that this construction would be required to transport the gas south from Brentwood. Therefore, the pipeline construction required for this alternative could total approximately 694 miles.

The Northwest/Southwest Alternative would require numerous major river crossings. These include the Bear River in Wyoming; Portneuf, Raft, Snake, Bruneau, and Owyhee Rivers in Idaho; South Fork Owyhee, North Fork Little Humboldt, Little Humboldt, and Truckee Rivers in Nevada; and the Sacramento River in California.

The Owyhee, North Fork Little Humboldt, Little Humboldt, and Truckee River crossings would occur at Class I points having the highest fishery resource value. In the area of the pipeline crossing, the Truckee River also contains two federally protected fish species, the Lahontan cutthroat trout (threatened) and the cui-ui or lakesucker (endangered). The Lahontan cutthroat trout may also be found in several of the Humboldt River tributaries that would be crossed by the alternative along Southwest's system in Nevada. The peregrine falcon, an endangered species, is known to nest along the drainage of the Snake River.

Generally, the Northwest/Southwest Alternative would cross several mountain ranges that are separated by alluvial basins and desert plains. In several areas near Reno, the terrain is particularly rocky and steep.

In western Nevada and eastern California, the alternative would traverse the Toiyabe and Tahoe National Forests, areas of high recreational interest. This alternative would also require construction near such urban areas as Sparks and Reno, Nevada and Auburn, Roseville, and Woodland, California.

A particular constraint on this alternative would be its passage through the Sierra Nevada Mountains in eastern California. Construction of the pipeline adjacent to the existing transportation corridors in this area and within the mountainous terrain of the Sierra Nevadas could be difficult; the terrain would also cause construction difficulties.

The Northwest/Southwest Alternative would transport the gas a total of 1,195 miles. Because it would require 84 more miles of pipeline construction than the proposed route and would cross difficult and sensitive areas in California, it was eliminated from further study. If the 148.3 miles of pipeline south of Brentwood are not required, this alternative would only be 545.8 miles long. Although the alternative would be shorter than the RMPP, the Northern Systems Alternative would still be superior because of its 76.8 miles length.

## Northern Route Alternative

The Northern Route Alternative (map F-1, AIEFGHNO) would require pipeline construction in Utah, Nevada, and California and also use PG&E's existing pipeline system in California. Beginning at Sage, Wyoming, the alternative route would pass south of Logan, Utah, and north of the Great Salt Lake to Highway 30. It would parallel Highway 30 to Interstate 80, then proceed west, paralleling Interstate 80 to Dunphy in Eureka County, Nevada. The alternative would continue west, paralleling the Western Pacific Railroad to Floka Siding in Humboldt County, Nevada. From this point, the route would proceed due west to Burney, California.

This alternative would require construction of 615 miles of 36-inch diameter pipeline between Sage and Burney (map F-1, AIF). An additional 135 miles of 36-inch diameter pipeline looping (map F-1, EFG) on PG&E's system would also be required to transport gas from Burney to PG&E's load center at Antioch in the San Francisco Bay area. The applicant's response discussed in relation to the Northern Systems Alternative indicates that transportation of the proposed volumes to areas farther south in California might require an additional 120 miles of pipeline construction connecting Brentwood with Panoche Junction on PG&E's southern system and 28.3 miles of pipeline construction between Hinkley and Adelanto. Thus, the Northern Route Alternative could require construction of 898.3 miles of pipeline to transport the gas approximately 1,222 miles.

The majority of the Northern Route would traverse the Great Basin in northern Nevada and require crossing several north-to-south mountain ranges. In Utah, this alternative would require construction through the Blacksmith Fork Canyon within the Caribou National Forest; in this area, it would also traverse portions of the Hardware Range Game Management Area. In northern Nevada, this alternative might cross the South Fork, Battle Mountain, and Winnemucca Indian Reservations.

The Northern Route Alternative would also require crossings of the Humboldt River and several tributaries within its drainage. These crossings might affect the habitat of the Lahontan cutthroat trout, a federally listed threatened fish species. Other major river drainages which would be crossed by this alternative include the Bear and Little Bear Rivers in Utah and the Pitt and Fall Rivers in California.

In northern California, the alternative would cross the Shasta and Modoc National Forests. This general area contains extensive recent lava flows and fault blocks. Lassen and Shasta Counties have active nests for the bald eagle, a federally listed endangered species.

Construction of the pipeline looping south of Burney would generally be within the Central Valley of California, an area of extensive cultivated agriculture. Additional constraints on this alternative include numerous BLM WSA's in central and northern Nevada and in northern California.

The Northern Route Alternative would also require 288 more miles of pipeline construction than the proposed route. Consequently, it was not considered further.

## Northern Route and Southwest Gas Alternative

Another alternative would combine a major part of the Northern Route Alternative and Southwest's pipeline corridor, then follow the PG&E system south to Panoche Junction (map F-1, AIJFGHNO). This alternative would transport the proposed volumes of gas from Sage Creek Junction along the Northern Route Alternative, through northern Nevada to the Southwest system in Humboldt County, Nevada (map F-1, location I). This part of the alternative would require approximately 410 miles of pipeline construction. The alternative route would then parallel Southwest's existing pipeline right-of- way south to Reno, Nevada, for 147 miles.

The remaining part of this alternative route would be similar to the route southwest of Reno described for the Northwest-Southwest Alternative. It would include 166 miles of new pipeline from Reno to Winters in California. Because of the RMPC data response (quoted in the discussion of the Northern Systems Alternative), 120 miles of pipeline construction between Brentwood and Panoche Junction and 28.3 miles of pipeline construction between Hinkley and Adelanto were included in the analysis.

The Northern Route and Southwest Gas Alternative, which would transport the gas 1,154 miles, could require 871.3 miles of new pipeline construction.

The alternative would cross the Bear and Little Bear Rivers in Utah, the Humboldt and Truckee Rivers in Nevada, and the Sacramento River in California. The endangered fish species that might be encountered in the Humboldt and Truckee Rivers are the same as those described for the Northwest/Southwest Alternative. Also, similar to the Northwest/Southwest Alternative, this alternative would require a passage through the Sierra Nevada Mountains in eastern California.

Because it would require construction of 261 more miles of pipeline than the proposed project and would cross heavily forested and potentially sensitive areas, this alternative was not analyzed in any further detail.

## Northwest/El Paso Alternative

The Northwest/El Paso Alternative shown on map F-1 (AKLM) would deliver the Rocky Mountain gas to southern California by expanding the capacity of Northwest's and El Paso's existing transmission systems. This alternative was analyzed for the 413,000-Mcfd volume proposed by the RMPC. Northwest would receive the gas approximately 15 miles northwest of its existing Kemmerer Compressor Station near Sage, Wyoming (map F-1, location A) and transport it about 500 miles south to its Ignacio Compressor Station in La Plata County, Colorado (map F-1, location K). From Ignacio, El Paso would transport the gas southwest approximately 480 miles to a connection with PG&E's system at the Arizona-California border (map F-1, location M).

Additional engineering information for the Northwest/El Paso Alternative can be found in appendix E. The facilities would be constructed adjacent to existing pipeline rights-of-way. This alternative would require approximately 733 miles of 36-inch diameter pipeline looping (413 miles adjacent to Northwest's system, 320 miles along El Paso's system) and approximately 8,350 hp. additional compression (350 hp. along Northwest's system; 8,000 hp. along the El Paso system). The incremental fuel consumption for the proposed volume would be about 7.9 times greater than that of the RMPP. This alternative would also require a new 3,730-hp. compressor station (Cortez) approximately half the distance between the existing Moab and Ignacio Compressor Stations on the Northwest pipeline system.

The required pipeline looping for this alternative would generally parallel and gradually cross the Rocky Mountains along the Northwest system. The scenic and wilderness qualities of this region have prompted numerous national parks, monuments, and recreation areas to be established there. The alternative could probably avoid many of these areas, but it might cross Arches National Park, Flaming Gorge National Recreation Area, San Juan and Ashley National Forests, and the Southern Ute

and Navajo Indian Reservations. Additional pipeline looping might be required for a route deviation to avoid the Arches National Park.

Construction adjacent to the Northwest system would encounter extremely rugged terrain. Looping along the Northwest system would also traverse the drainage basins of the Green, White, Colorado, and San Juan Rivers.

The topography along the El Paso system varies from badlands to predominantly flat terrain, including several desert areas. Pipeline looping along this system could require crossings of the Coconino, Kaibab, and Prescott National Forests, and the Little Colorado River drainage basin.

Because the Northwest/El Paso Alternative would require 123 miles more pipeline construction than the proposed route, it was not analyzed in any further environmental detail.

This alternative was also analyzed for the 800,000-Mcfd volume. (See appendix E for the engineering analysis of this alternative.) For this level of operation, the Northwest/El Paso Alternative would require approximately 1,034 miles of 36-inch diameter pipeline looping and approximately 66,900 hp. of additional compression. The incremental fuel consumption for this level would be about 3 times greater than that of the proposed RMPP. A new compressor station would also be required on Northwest's system between its existing Rangely and Moab Compressor Stations in addition to the Cortez Compressor Station discussed for the 413,000-Mcfd level.

Because the 800,000 Mcfd level would require at least 424 miles more pipeline construction than the proposed route and create additional impact adjacent to both Northwest's and El Paso's existing systems, it was eliminated from any further detailed study.

## Northwest/PGT/PG&E Alternative

The Northwest/PGT/PG&E Alternative would transport the proposed volumes of gas by constructing 36-inch diameter pipeline looping adjacent to the Northwest, PGT, and PG&E existing systems. (On map F-1, this alternative is ABCDEFGHNO.) The proposed gas volumes would either be transported on the Northwest system to a connection between the Northwest and PGT systems at Stanfield, Oregon (map F-1, location D), or be transported by Northwest to its market areas in exchange for natural gas from other sources which it would deliver to the PGT system at Stanfield, Oregon, or Spokane, Washington, the two points where the existing PGT and Northwest systems interconnect. From either Spokane or Stanfield, or both, PGT would transport the gas on its existing system to a connection with PG&E's system at the Oregon-California border. The gas would then be transported by PG&E through its existing system to its load center at Antioch.

This portion of the alternative would require 76.8 miles of 36-inch diameter looping on Northwest's system and a total of 428 miles of 36-inch diameter looping on PGT's and PG&E's systems. Again, as for the Northern Systems Alternative, in order to transport the proposed volumes south from PG&E's load center at Antioch, RMPC has indicated that an additional 120 miles of pipeline between Brentwood and Panoche Junction and 28.3 miles of pipeline between Hinkley and Adelanto might be required. Therefore, the Northwest/PGT/PG&E Alternative could require 653.1 miles of pipeline construction to transport 413,000 Mcfd; it would be 43.1 miles longer than the proposed RMPP. The alternative would transport the gas a total of 1,604 miles.

Another version of this alternative, the Northern Systems Alternative, would reduce the pipeline required to only 225.1 miles of new construction by modifying the design and operation of pipeline looping that has been authorized but not constructed on the PGT and PG&E transmission systems. (See the Northern Systems Alternative discussion for more information.) Because the Northern System Alternative is superior to the Northwest/PGT/PG&E Alternative, the latter alternative was not analyzed in any more detail.

## North-South Alternative

The North-South Alternative would combine the existing systems described in the Northwest/PGT/PG&E Alternative and the Northwest/El Paso Alternative. The facility requirements for this alternative, constructed adjacent to the existing rights-of-way of these systems, would allow half the gas volumes to be transported north and half to be transported south from the Rocky Mountain Overthrust Belt. Additional engineering information for the North-South Alternative can be found in appendix E, table E-11.

The combined use of these two total system alternatives was first analyzed for transporting 400,000 Mcfd of gas, approximating the proposed RMPP volumes. Under this hypothesis, 200,000 Mcfd of gas would be transported north through the Northwest/PGT/PG&E systems and 200,000 Mcfd of gas would be transported south through the North-

west/El Paso systems. Transportation of these volumes would require a total of 736 miles of 36-inch diameter pipeline looping adjacent to the Northwest, El Paso, PGT, and PG&E systems. This total includes 120 miles of pipeline between Brentwood and Panoche Junction and 28.3 miles of pipeline between Hinkley and Adelanto, south of Antioch, California. Additional compression (3,820 hp.) would be required only on El Paso's system. The incremental fuel consumption for transporting the 400,000-Mcfd gas volumes would be about 23 Mcfd.

This alternative would require 126 more miles of pipeline than the proposed project.

This alternative was also analyzed at the 800,000 Mcfd gas level. At this volume, 400,000 Mcfd of gas would be transported north through the Northwest/PGT/PG&E systems; 400,000 Mcfd of gas would be transported south through the Northwest/El Paso systems. A total of 1,386 miles of 36-inch diameter pipeline looping would be constructed, and approximately 8,750 hp. of additional compression would be required. The incremental fuel consumption for transporting 800,000 Mcfd would be about 3.5 times greater than that of the same expansion volumes for the RMPP.

Because this alternative could require at least 776 miles more pipeline construction than the proposed route to transport 800,000 Mcfd, as well as additional pipeline construction adjacent to Northwest's, El Paso's, PGT's and PG&E's existing systems, it was eliminated from any further detailed study.

If the 148.3 miles of pipeline south of Brentwood were not required, the North-South Alternative would only be 587.7 miles long. Since it would not be significantly shorter than the RMPP and would consume significantly more fuel gas, the alternative was not analyzed in further environmental detail.

## ROUTE ALTERNATIVES

### Salt Lake Valley Alternative

The Salt Lake Valley Alternative would follow the proposed action to MP 35, pass southwest to Croydon, Utah, and cross the Wasatch Range through Weber Canyon, following Interstate Highway 30N. It would then emerge from the canyon by Hill Air Force Base and turn south, bordering the west side of Salt Lake City, and continue south to merge with the proposed action at MP 182 east of Delta, Utah. This alternative was eliminated from further consideration for several reasons. The Wasatch Range is highly faulted in the vicinity of Weber Canyon. Several years ago, Mountain Fuel evaluated Weber Canyon as a route for a 21-inch diameter gas pipeline and decided that the canyon was already too congested: it contains a 16-inch diameter natural gas pipeline, two oil pipelines, two railroad tracks, a WPRS canal, a four-lane interstate highway, a high-voltage electric transmission line, a railroad power and signal line, and interstate and local telephone cables. The company decided that construction would be difficult (Carricaburu 1977). The urban congestion in Salt Lake City would also have caused extensive right-of-way and construction difficulties.

### Spanish Fork Canyon Alternative

The Spanish Fork Canyon Alternative would leave the proposed route at approximately MP 150, pass through Spanish Fork Canyon, and emerge from the canyon near East Bennett, Utah. It would then pass along the toe of the mountains paralleling U.S. Highway 91 and the railroad, pass west of Nephi, and rejoin the proposed action near Nephi at MP 197.

This alternative was eliminated from further consideration due to the anticipated congestion of the existing facilities in Spanish Fork Canyon.

### Cedar City Alternative

The Cedar City Alternative would depart from the proposed route at MP 340, follow a paved road to Cedar City, pass west of Cedar City, and parallel U.S. Highway 91. It would then pass south of St. George, Utah, and continue to follow Highway 91 to Glendale, Nevada, where it would rejoin the proposed action at MP 459. It was considered but eliminated because it offered no environmental advantages to offset its increased length.

### Moapa-Las Vegas Alternative

This alternative would follow the proposed action until near Glendale, Nevada, at about MP 460. It would then pass west of Interstate 15, U.S. Highway 91, and the railroads. The alternative would

parallel these facilities, then cross north of Nellis Air Force Base and west of Frenchman Mountain. It would continue between East Las Vegas and Henderson and rejoin the proposed action at MP 542. The Moapa-Las Vegas Alternative was modified using suggestions from the applicant and local agencies and refined into the East Las Vegas Variation, which was studied in detail as Variation 3.

## Warm Springs Alternative

The Warm Springs Alternative would allow the RMPP to serve as a collection pipeline for Utah gas development, if such development occurs.

This alternative would follow the proposed action until MP 366 near Newcastle, Utah. It would then follow Utah Highway 56 to the Utah/Nevada state line, where the highway becomes Nevada Highway 25. The alternative would follow Highway 25 to Panaca, Nevada, where it would merge with U.S. Highway 93, and then follow Highways 93 and 25 to Crystal Springs, Nevada. It would follow Nevada Highway 25 to Warm Springs, Nevada, where it would connect with the Central Nevada Alternative at MP 300.

Since it would require a longer pipeline but offered no environmental advantages, the Warm Springs Alternative was eliminated from further consideration.

## Variation 1--Strawberry Reservoir Variation

This variation would provide an alternative route around the east side of Strawberry Reservoir. It would lessen the recreational and visual impacts on the area. No additional aboveground facilities would be required. The Strawberry Reservoir Variation was eliminated from detailed evaluation because it offered no significant environmental advantages. However, it would cross the Uinta and Ouray Indian Reservation and a steep scenic gorge called 'The Narrows.' The portion of the proposed action which it would replace has no similar environmental problems.

# Appendix G

# Location of Pipeline Routes in Existing Corridors

The Federal Land Policy and Management Act of 1976 mandates BLM and the FS to consider how well project proposals follow existing corridors. Consequently, each alternative was analyzed to determine which portions would be within an existing utility or transportation corridor. A map reconnaissance of each route was conducted using USGS 1:250,000-inch scale maps. If an existing road, railroad, or utility line was within 1 mile of the alternative, the route was considered to be within that corridor. The information contains some data gaps and should not be considered as all inclusive.

The results of this analysis are shown in table G-1 and G-2.

TABLE G-1

LOCATION OF PIPELINE ROUTE IN EXISTING CORRIDORS

| | MP | Utility/Transportation Corridor |
|---|---|---|
| Proposed Action | 0-9 | Other roads |
| | 9-23 | Utah State Highway 16 |
| | 27-38 | Other roads |
| | 43-44 | Other roads |
| | 50-52 | Other roads, Interstate Highway 80(1) |
| | 65-75 | Utah State Highway 133 |
| | 79-84 | Utah State Highway 133 |
| | 85-91 | Interstate 80, U.S. Highway 189A, Union Pacific Railroad, other roads |
| | 96-99 | U.S. Highway 189A |
| | 99-105 | Other roads |
| | 105-108 | U.S. Highway 189A |
| | 122-130 | Other roads |
| | 130-134 | U.S. Highway 40 |
| | 134-140(?) | Other roads |
| | 185-195 | Utah State Highway 132 |
| | 195-200 | U.S. Highway 1, Union Pacific Railroad |
| | 200-205 | Union Pacific Railroad |
| | 205-214 | U.S. Highway 91, Union Pacific Railroad |
| | 214-224 | U.S. Highway 91 |
| | 232-275 | U.S. Highway 91 |
| | 279-290 | Other roads |
| | 296-303 | Other roads, powerline(?) |
| | 303-308 | Other roads |
| | 317-333 | Other roads |
| | 349-356 | Other roads |
| | 356-378 | Other roads, telephone line |
| | 378-389 | Utah State Highway 18 |
| | 396-408+(?) | Telephone line |
| | 453-463 | U.S. Highway 91 |
| | 480-483 | Other roads |
| | 486-490 | Other roads |
| | 490-492 | Other roads, railroads |
| | 498-502 | Other roads |
| | 505-511 | Other roads, powerline |
| | 515-558 | U.S. Highway 95 |
| | 561-591 | Other roads, telephone line |
| Alternative A, Northern Systems Alternative | | |
| Kemmerer Loop | | |
| | 0-12 | Pipeline, U.S. Highway 30N, Union Pacific Railroad |
| | 12-21.7 | Pipeline |
| Pegram Loop | | |
| | 34.5-39 | Pipeline |
| | 39-41 | Pipeline, U.S. Highway 30N, Union Pacific Railroad |
| Soda Springs Loop | | |
| | 66.3-73 | Pipeline, U.S. Highway 30N |
| | 73-74 | Pipeline, U.S. Highway 30N, Union Pacific Railroad |
| | 74-78 | Pipeline |
| | 78-85 | Pipeline, U.S. Highway 30N, Union Pacific Railroad |
| | 85-89 | Pipeline |
| Pocatello Loop | | |
| | 143-151 | Pipeline |
| | 151-168 | Pipeline, Interstate 15W |
| Brentwood-Panoche Segment | | |
| | 0-7 | Pipeline |
| | 7-11 | Pipeline, Southern Pacific Railroad, California State Highway 33 |
| | 11-17 | Pipeline |
| | 17-48 | Pipeline, Interstate Highway 580, Interstate Highway 5 |
| | 48-66 | Pipeline |
| | 66-69 | Pipeline, Interstate Highway 5 |
| | 69-73 | Pipeline |
| | 73-84 | Pipeline, Interstate Highway 5 |
| | 84-96 | Pipeline, Interstate Highway 5 |
| | 96-107 | Pipeline, Interstate Highway 5, powerline |
| | 107-108 | Pipeline |
| | 108-120 | Pipeline, powerline |
| Hinkley-Adelanto Segment | | |
| | 0-2 | Pipeline |
| | 2-4 | Pipeline, road |
| | 4-8 | Pipeline |
| | 8-28 | Pipeline, Union Pacific Railroad, Atchinson, Topeka, and Santa Fe Railroad, road |
| Alternative B, Sanpete Valley Alternative | | |
| | 9-24 | State Highway 16 |
| | 66-84 | State Highway 133 |
| | 86-108 | U.S. Highway 189 Alternative |
| | 146-176 | Moon Lake[1/] |
| | 176-B120* | U.S. Highway 89, Railroad, and IPP* |
| | B125-B131 | U.S. Highway 89, and IPP |
| | B163-B171 | U.S. Highway 91, Interstate Highway 15, and IPP |
| | B184-B200 | Telephone line and IPP |
| | 356-389 | Telephone line and IPP |
| | 397-406 | Telephone line and IPP |
| | 450-466 | U.S. Highway 91 |
| | 490-520 | IPP |
| | 516-531 | U.S. Highway 95 |
| | 541-559 | U.S. Highway 95 |
| Alternative C, Central Nevada Alternative | | |
| | 9-24 | State Highway 16 |
| | 66-84 | State Highway 133 |
| | 86-108 | U.S. Highway 189 Alternative |
| | 146-190 | Moon Lake electrical transmission line |
| | C0-C33 | State Highway 132 and IPP |
| | C33-C45 | U.S. Highways 6 and 50 and railroad |
| | C45-C157 | U.S. Highways 6 and 50 and IPP |
| | C169-C460 | U.S. Highway 6 |

# APPENDIX G--LOCATION OF PIPELINE ROUTES IN EXISTING CORRIDORS

TABLE G-1—Continued

| | MP | Utility/Transportation Corridor |
|---|---|---|
| C210-C220 | | Mt. Wheeler electrical transmission lines |
| | C484-C491 | U.S. Highway 395 |
| | C521-C596 | U.S. Highway 395 and railroad |
| | C601-C608 | U.S. Highway 395 |
| | C613-C666 | U.S. Highway 395 |
| Alternative D, Sevier-Escalante Desert Alternative | | |
| | 9-24 | State Highway 16 |
| | 66-84 | State Highway 133 |
| | 86-108 | U.S. Highway 189 Alternative |
| | 146-190 | Moon Lake electrical transmission line |
| | D0-D33 | State Highway 132 |
| | D33-D43 | U.S. Highways 6 and 50 and railroad |
| | D58-D124 | State Highway 257 and Union Pacific Railroad |
| | D100-D160 | IPP |
| | D160-D185 | IPP |
| | D124-D164 | Union Pacific Railroad |
| | 364-389 | Telephone line and IPP |
| | 397-406 | Telephone line |
| | 450-466 | U.S. Highway 91 |
| | 490-520 | IPP |
| | 516-531 | U.S. Highway 95 |
| | 541-559 | U.S. Highway 95 |
| Alternative E, West Salt Lake Alternative | | |
| Kemmerer | | |
| | A0-A22 & 33-40 | U.S. Highway 30, State Highway 89, and railroad |
| | E0-E43 | State Highway 34 |
| | E46-E59 | State Highway 23 and railroad |
| | E72-E80 | Union Pacific Railroad |
| | E216-E232 | Interstate Highway 80 and railroad |
| | E336-E363 | Railroad |
| | 254-275 | U.S. Highway 91 |
| | 354-389 | Telephone line & IPP |
| | 397-406 | Telephone line |
| | 450-466 | U.S. Highway 91 |
| | 490-520 | IPP |
| | 516-531 | U.S. Highway 95 |
| | 541-559 | U.S. Highway 95 |
| Alternative F, Provo Canyon Alternative | | |
| | 9-24 | State Highway 16 |
| | 66-84 | State Highway 133 |
| | 86-108 | U.S. Highway 189 Alternative |
| | F16-F29 | U.S. Highway 189, railroad, pipeline |
| | F39-F47 | State Highway 80 |
| | 214-222 | U.S. Highway 91 |
| | 232-275 | U.S. Highway 91 |
| | 354-389 | Telephone line |
| | 397-406 | Telephone line |
| | 450-466 | U.S. Highway 91 |
| | 490-520 | IPP |
| | 516-531 | U.S. Highway 95 |
| | 541-559 | U.S. Highway 95 |
| Variation 2, Thistle Creek Variation | | |
| Entire Variation | | State Highway 89 and Denver & Rio Grande Western Railroad |
| Variation 3, East Las Vegas Variation | | |
| | 16-20 & 20-24 | Water-Wastewater line right-of-way and unnumbered road |
| | 24-28 | Highway 515 proposed right-of-way |
| | 49-59 | U.S. Highway 95 |
| Variation 4, Fort Mojave Variation | | |
| | None | None |
| Variation 5, Mill Creek Variation | | |
| | 0-4 | U.S. Highways 6 and 50 and Denver and Rio Grande Western Railroad |
| Variation 6, Daniels Canyon Variation | | |
| | 12-30 | U.S. Highway 40 and State Highway 189 |
| | 30-36 | Strawberry Reservoir west shore road |

*B120 Refers to MP 120 on Alternative B.

1/Moon Lake and Intermountain River Project (IPP) both have proposed electrical transmission lines. The routes for these lines and the corridors they would follow are referred to here.

## TABLE G-2

## PERCENTAGE OF PIPELINE ROUTES WITHIN EXISTING CORRIDORS

| Alternative | Alternative Length (miles) | Length Alternative within Existing Utility/ Transportation Corridor (miles) | Percent of Alternative Length within Existing Utility/ Transportation Corridor (percent) |
|---|---|---|---|
| Proposed Action | 610 | 362 | 59 |
| Northern Systems Alternative | 225 | 222 | 99 |
| Sanpete Valley Alternative | 630 | 356 | 57 |
| Central Nevada Alternative | 862 | 689 | 80 |
| Sevier-Escalante Desert Alternative | 622 | 283 | 61 |
| West Salt Lake Alternative | 747 | 279 | 37 |
| Provo Canyon Alternative | 619 | 250 | 40 |
| Thistle Creek Variation | 27 | 27 | 100 |
| East Las Vegas Variation | 59 | 22 | 37 |
| Fort Mojave Variation | 10 | 0 | 0 |
| Mill Creek Variation | 21 | 4 | 19 |
| Daniels Canyon Variation | 52 | 24 | 46 |

# Appendix H

# Affected Threatened and Endangered Vegetation Species

The following information identifies the current status of threatened and endangered vegetation species that might be affected by the proposed pipeline route, its alternatives, and variations. Table H-1 summarizes this information. Direct impact to those species cannot be assessed until an alignment is staked and a biological survey is conducted to locate species or populations near that line.

TABLE H-1

THREATENED AND ENDANGERED SPECIES

(That Have a High Probability of Being Located Along the Pipeline Route, Alternative, or Variation)

| Species | Status | RMPP | Alternative A | Alternative B | Alternative C | Alternative D | Alternative E | Alternative F | Variation 5 | Variation 6 |
|---|---|---|---|---|---|---|---|---|---|---|
| Agave utahensis var. eborispina | C | X | | X | | X | X | X | | |
| Allium passeyi | C | | | | | | X | | | |
| Amsinckia grandiflora | RE | | X | | | | | | | |
| Arctomecon californica | C | X | | X | | X | X | X | | |
| Aretomecon humilis | E | X | | X | | X | X | X | | |
| Asclepias eastwoodiana | C | | | | X | | | | | |
| Astragalus callithrix | C | | | | X | | | | | |
| Astragalus desereticus | C | X | | X | X | X | | | | |
| Astragalus funereus | C | | | | X | | | | | |
| Astragalus lentiginosus var. latus | C | | | X | | | | | | |
| Astragalus uncialis | C | | | | X | | | | | |
| Chorizanthe spinosa | C | | | | X | | | | | |
| Cryptantha hoffmannii | C | | | | X | | | | | |
| Cuscuta warneri | C | | | | | X | | | | |
| Echinocerous englemannii var. purpureus | E | X | | X | | X | X | X | | |
| Eriogonum eremicum | C | | | | X | | | | | |
| Eriogonum nanum | T | | | | X | | | | | |
| Eriogonum ostlundii | C | | | X | | | | | | |
| Eriogonum vestitum | C | | X | | | | | | | |
| Haploppapus watsonii | W | | | | X | | | | | |
| Lesquerella garrettii | C | | | | | | | X | | |
| Machaeranthera kingii | C | | | | | | | | | X |
| Mentzelia argillosa | C | | | X | | | | | | |
| Opuntia pulchella | W | | | | X | | | | | |
| Penstemon bicolor Ssp. bicolor | C | X | | X | | X | X | X | | |
| Penstemon garrettii | C | | | | X | | | X | | |
| Penstemon tidestromii | C | X | | | X | X | | | | |
| Phacelia anelsonii | C | X | | X | | X | X | X | | |
| Phacelia argillacea | E | | | | | | | | X | |
| Phacelia utahensis | C | | | | | | | | | |
| Phlox glandiformis | C | | | X | | X | X | X | | |
| Puccinella parishii | C | | X | | | | | | | |
| Sclerocactus polyancustrus | C | | | | X | | | | | |
| Spartina gracilis | R | | | | X | | | | | |
| Sphaeralcea caespitosa | C | | | | X | | | | | |
| Tropidocarpum capparideum | RE | | X | | | | | | | |

C=Currently under review, *Federal Register* 1980; considered as a candidate for formal listing.
E=Listed as endangered in *Federal Register* 1980.
T=State listed as threatened; no protection under state law.
R=Rare in California; common elsewhere.
RE=Rare and Endangered in California; protected under state law.
W=Watch list in Nevada; no formal protection under state law.

# Appendix I

# Visual Resource Management Impact Methodologies

The BLM's Visual Resource Management (VRM) system and the FS's Visual Management System (VMS) were used to analyze the landscape which the proposed action, alternatives, and variations would traverse.

To compare the visual impact of the RMPP and its alternatives, the VRM system was applied to lands managed by the BLM, as well as other Federal lands (other than National Forest lands for which the VMS procedure was applied), and state, local, and private lands.

The following three sections describe the VRM system, the VMS, and the BLM contrast rating procedure. A further explanation of each process may be found by referring to the sources used as a basis for the discussion.

## THE BLM VISUAL RESOURCE MANAGEMENT SYSTEM

The VRM system is an analytical process that identifies, sets, and meets objectives for maintaining scenic values and visual quality (BLM 1978b, 1980f).

The system is based on research that has produced ways of assessing aesthetic qualities of the landscape in objective terms. Aesthetic judgments considered extremely subjective were found to have identifiable, consistent qualities that can be described and measured. Whatever the terrain (and whoever the observer), perception of visual quality in a landscape seems to be based on three common principles:

- Landscape character
- Influence of form, line, color, and texture
- Visual variety

Landscape character is primarily determined by the four basic visual elements of form, line, color, and texture. Although all four elements are present in every landscape, they exert varying degrees of influence. The stronger the influence exerted by these elements, the more interesting the landscape. The more visual variety in a landscape, the more aesthetically pleasing the landscape. Variety without harmony, however, is unattractive, particularly if alterations (cultural modifications) are made carelessly.

The VRM system (see figure I-1, for flow diagram) involves a four-step process: 1) determining the scenic quality of a landscape, 2) measuring the visual sensitivity of an area, 3) determining distance zones, and 4) compiling all the information into management classes for guidance in assessing environmental impact.

## Scenic Quality

Scenic quality is perhaps best described as the overall impression retained after driving through, walking through, or flying over an area of land. In the VRM process, rating scenic quality requires a brief description of the existing scenic values in a landscape.

When inventoried, an area is first divided into subunits that appear homogeneous, generally in terms of landform and vegetation. Each area is then rated by seven key factors: landform, vegetation, water, color, influence of adjacent scenery, scarcity, and cultural modification. A standardized point system assigns great, some, or little importance to each factor. The values for each category are calculated, and according to total points, three scenic quality classes are determined and mapped:

Class A--Areas that combine the most outstanding characteristics of each rating factor.

Class B--Areas which combine some outstanding features and some that are fairly common to the physiographic region.

Class C--Areas where the features are fairly common to the physiographic region.

## Sensitivity Levels

Although landscapes have common elements that can be measured, there is still a subjective dimension to landscape aesthetics. Each viewer brings perceptions formed by individual influences, culture, visual training, familiarity with local geography, and personal values.

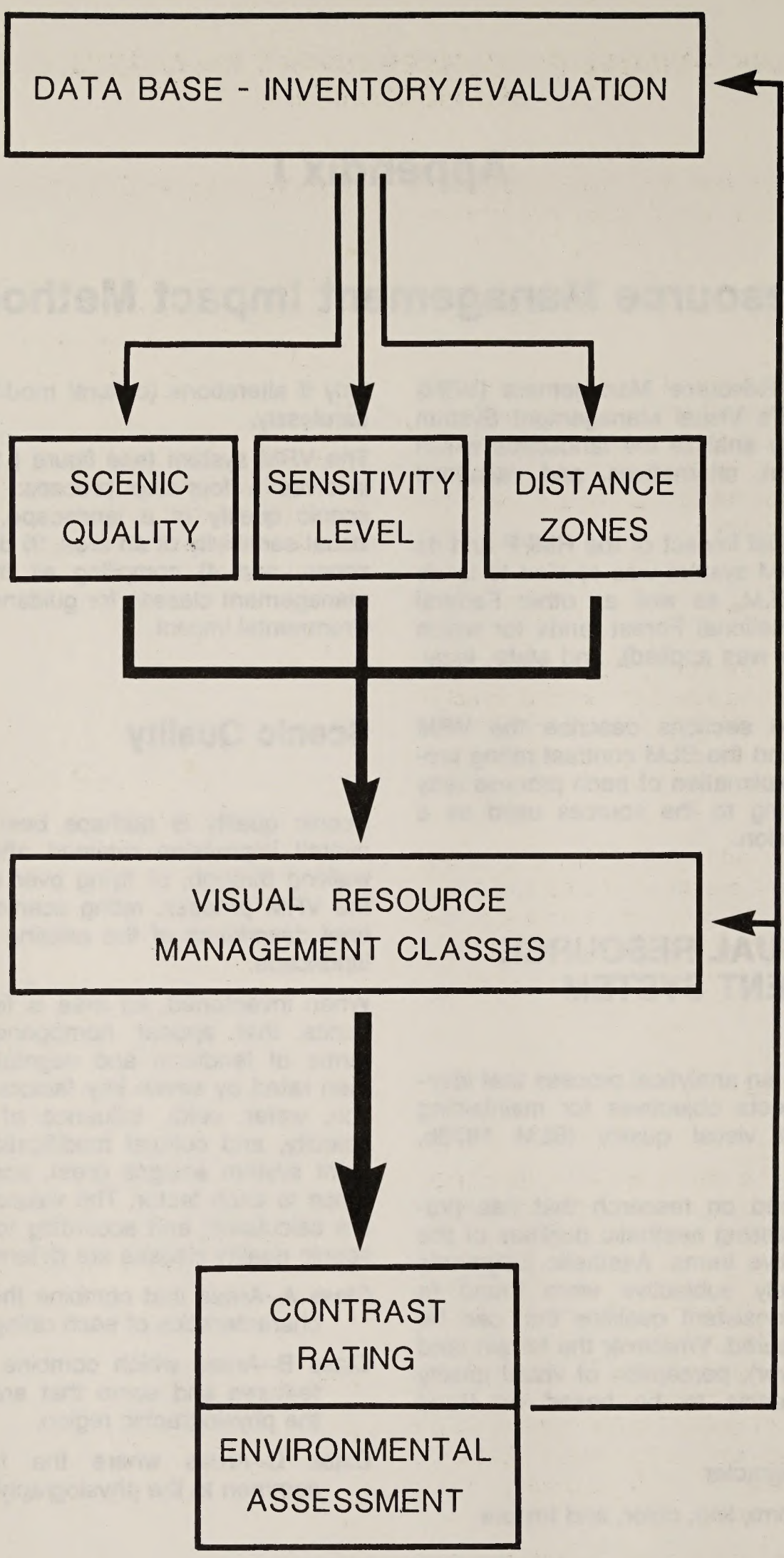



**FIGURE I-1 THE VISUAL RESOURCE MANAGEMENT SYSTEM PROCESS**

# APPENDIX I--VISUAL RESOURCES IMPACT MANAGEMENT IMPACT METHODOLOGIES

To measure regional and individual attitudes in evaluating a landscape, visual sensitivity is determined in two ways:

**Use volume**

Frequency of travel through an area (by road, trail, and river) and use of that area (for recreation, camping, and events) are tabulated. The area is then assigned a high, medium, or low rating according to predetermined classifications.

**User or public reaction**

Public groups are familiarized with the area (if necessary) and asked to respond to activities that will modify that landscape. The concern they express about proposed changes in scenic quality is also rated high, medium, or low.

The various combinations of use volume and user reaction for each area are converted by a matrix to an overall sensitivity rating of high, medium, or low. A map is then developed that illustrates these sensitivity levels.

## Distance Zones

The visual quality of a landscape (and user reaction) may be magnified or diminished by the visibility of the landscape from major viewing routes and key observation points.

A landscape scene or 'seen area' can be divided into three basic distance zones: 1) foreground/ middleground, 2) background, and 3) seldom-seen. Because areas that are closer have a greater effect on the observer, such areas require more attention than do areas that are farther away. Distance zones allow consideration of the proximity of the observer to the landscape.

Selection of the key viewing points and accurate assessment of distance zones require some judgment. Where several viewing routes exist, what is foreground from one route may be background from another. In that case, the more restrictive designation is thus used. Atmospheric conditions may also modify the perception of distance.

The process culminates in a final distance zone map.

## Management Classes

Management classes describe the different degrees of modification allowed to the basic elements of the landscape. Class designations are derived from an overlay technique that combines the maps of scenic quality, sensitivity levels, and distance zones. The overlays are used to identify areas with similar combinations of factors. These areas are assigned to one of five management classes according to predetermined criteria. The resulting map of contiguous areas sharing the same VRM class is used to assess the visual impact of proposed development.

The five classes are:

**Class 1**

This class provides primarily for natural ecological changes; management activities are to be restricted and are not to attract attention.

**Class 2**

Changes in basic elements by management activities should not be evident in the characteristic landscape.

**Class 3**

Contrasts to the basic elements may be evident and begin to attract attention, but they should remain subordinate to the existing characteristic landscape.

**Class 4**

Alterations may attract attention but should repeat the form, line, color, and texture characteristics of the landscape.

**Class 5**

Rehabilitation is needed to restore the landscape to the character of the surrounding landscape.

# APPENDIX I--VISUAL RESOURCES IMPACT MANAGEMENT IMPACT METHODOLOGIES

## THE FS VISUAL MANAGEMENT SYSTEM

The VMS establishes criteria for identifying and classifying scenic qualities as well as aesthetic concern for those qualities on National Forest lands (FS 1974). The process establishes quality objectives for altering the visual resource by recognizing the great variation in visual strength of the various types of natural landscapes and their inherent capabilities to accept change.

In this process, a particular landscape is placed within a framework for analysis. (See figure I-2 for diagram.) The framework is the character type or common distinguishing visual characteristic of landform, water forms, and vegetative patterns based upon physiographic regions as defined by Nevin M. Fenneman (1981). The characteristic landscape is the naturally established landscape being viewed; it serves as the final basis for analyzing and comparing the appropriateness of a management activity against the prescribed VQO.

The VQO incorporates the extreme variability of the land's scenic quality, the visual sensitivity of the land, and the ability of various forest landscapes to undergo alteration.

## Variety Classes

Variety classes are obtained by classifying landscapes into those where the scenic quality is most important and those where it is of lesser value. The classification is based on the premise that all landscapes have some value, but those with the most variety or diversity have the greatest potential for high scenic value. There are three variety classes which identify the scenic quality of the natural landscape:

**Class A, Distinctive**

Areas where features of landform, vegetative patterns, water forms, and rock formations are of unusual or outstanding visual quality. They are usually not common in the character type.

**Class B, Common**

Areas where features contain variety in form, line, color, and texture or combinations thereof, but which tend to be common throughout the character type and are not outstanding in visual quality.

**Class C, Minimal**

Areas where features have little change in form, line, color, or texture. Includes all areas not included in Classes A and B.

## Sensitivity Levels

Sensitivity levels are a measure of people's concern for the scenic quality of the National Forests. These levels are determined for land areas viewed by those who are traveling through the forest on developed roads and trails, are using areas such as campgrounds and visitor centers, or are recreating at lakes, streams, and other water bodies. All National Forest land is seen at least by aircraft users; therefore, some degree of visitor sensitivity exists for the entire land base.

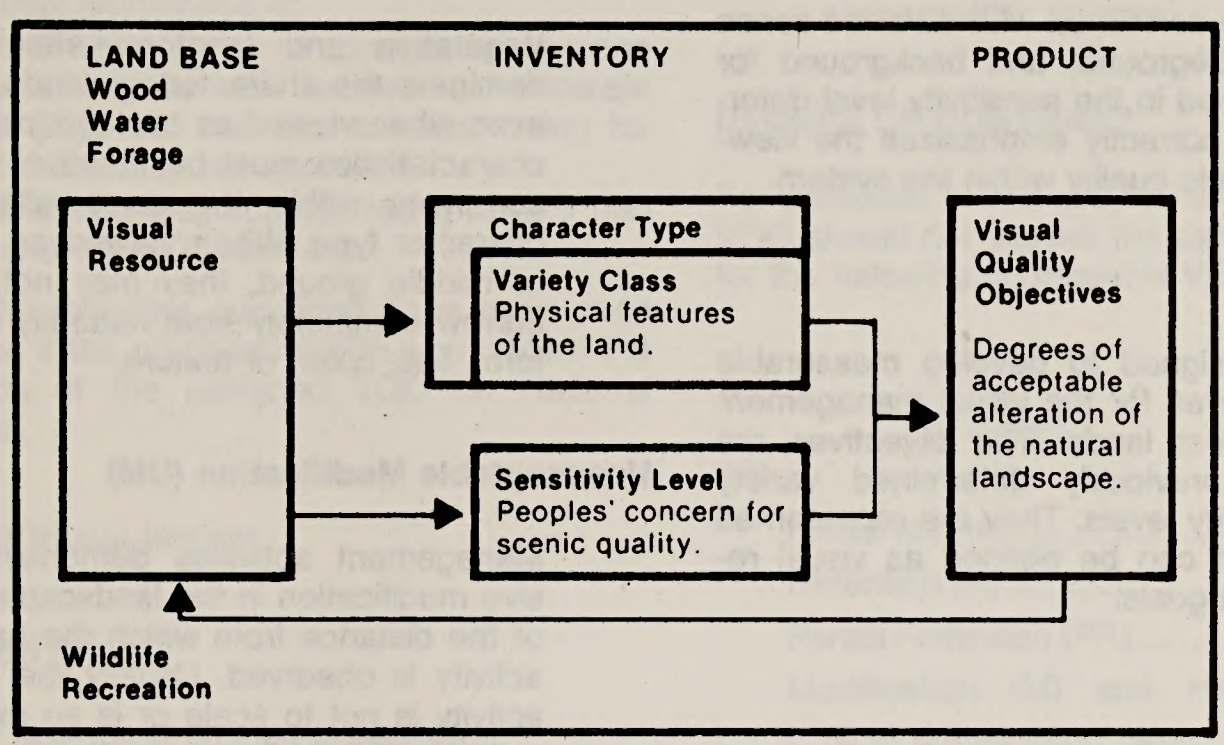
Three sensitivity levels, each identifying a different level of user concern for the visual environment, are employed;

**Level 1, Highest Sensitivity**

Level 1 includes all areas seen from *PRIMARY* travel routes, use areas, and water bodies where, as a minimum, at least one fourth of the forest visitors have a *MAJOR* concern for the scenic qualities. Level 1 also includes all areas seen from *SECONDARY* travel routes, the use area, and water bodies where at least three-fourths of the forest visitors have a *MAJOR* concern for the scenic qualities.

**Level 2, Average Sensitivity**

Includes all areas seen from *PRIMARY* travel routes, the use area, and water bodies where fewer than one-fourth of the forest visitors have a *MAJOR* concern for scenic qualities. Level 2 also includes all areas seen from *SECONDARY* travel routes, use areas, and water bodies where at least one fourth and not more than three-fourths of the forest visitors have a *MAJOR* concern for scenic qualities.




# FIGURE I-2 THE VISUAL RESOURCE MANAGEMENT SYSTEM PROCESS

**Level 3, Lowest Sensitivity**

Includes all areas seen from *SECONDARY* travel routes, use areas, and water bodies where less than one-fourth of the forest visitors have a *MAJOR* concern for scenic qualities and all National Forest land not seen from any travel route, use area, or water body. (Level 3 does not include any area seen from *PRIMARY* routes or areas.)

Sensitivity levels are correlated with distance zones of foreground, middleground, and background for seen areas established in the sensitivity level determination. This step correctly emphasizes the viewers' concern for scenic quality within the system.

**Quality Objectives**

The VQO's are designed to develop measurable standards or objectives for the visual management of all National Forest lands. The objectives are based upon the previously determined variety classes and sensitivity levels. They are represented by five terms which can be defined as visual resource management goals.

**Preservation (P)**

Preservation allows for ecological changes only. Management activities, except for very low visual impact recreation facilities, are prohibited.

**Retention (R)**

Activities may only repeat form, line, color, and texture which are frequently found in the characteristic landscape.

**Partial Retention (PR)**

Management activities must remain visually subordinate to the characteristic landscape. Activities may repeat or introduce form, line, color, or texture common to the characteristic landscape, but changes in their size, amount, intensity, direction, pattern, etc., must remain visually subordinate to the characteristic landscape.

**Modification (M)**

Modification activities may visually dominate the original characteristic landscape. However, vegetation and landform alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that the visual characteristics are those of natural occurrences within the surrounding area or character type. Additional elements must remain visually subordinate to the proposed composition.

**Maximum Modification (MM)**

Vegetation and landform alterations may dominate the characteristic landscape. However, when viewed as background, the visual characteristics must be those of natural occurrences within the surrounding area or character type. When viewed as foreground or middle ground, they may not appear to borrow completely from naturally established form, line, color, or texture.

**Unacceptable Modification (UM)**

Management activities demonstrate excessive modification in the landscape regardless of the distance from which the management activity is observed. Usually the size of the activity is not to scale or is so excessive as to contrast with the characteristic landscape.

## THE BLM VISUAL RESOURCE CONTRAST RATING SYSTEM

The objective of the visual resource contrast rating system is to provide a measure of whether the proposed action will meet the requirements of the assigned VRM classes (FS 1974, BLM 1978b, BLM 1980f). The degree to which a management activity adversely affects the visual quality of a landscape depends on the extent of visual contrast that is created between the activity and the existing landscape character. Contrast is measured by separating the landscape into land and water surfaces, vegetation, and structures and then predicting the magnitude of contrast with the basic elements (form, line, color, and texture) for each of these major features. Assessing the degree of contrast will indicate the severity of impact and will guide the plans for mitigating the contrasts to meet the requirements of the VRM classes. Contrasts are considered from the most critical viewpoints for distance, angle of observation, length of time, relative size of the project, season of the year, light, and the effects of time on the healing process.

# APPENDIX I--VISUAL RESOURCES IMPACT MANAGEMENT IMPACT METHODOLOGIES

The following parameters have been applied to determine if the proposed action will meet the requirements of the assigned VRM classes.

Class I: The degree of contrast for any one element may not exceed a weak degree of contrast (Ix), and the total contrast rating for any one feature may not exceed I0.

Class 2: The degree of contrast for any one element may not exceed a moderate value (2x), and the total contrast rating for any feature may not exceed I2.

Class 3: The degree of contrast for any one element should not exceed a moderate value (2x), and the total contrast rating for any feature may not exceed I6.

Class 4: The total contrast rating for any feature should not exceed 20.

Likewise, the following guidelines have been used to determine if the proposed action would meet the requirements of the assigned VQO on National Forest lands.

**Duration of Visual Impact**

**Preservation (P)**

Only ecological change is permitted.

**Retention (R)**

Immediate reduction in form, line, color, and texture contrast should be accomplished either during construction or immediately after.

**Partial Retention (PR)**

Reduction in form, line, color, and texture contrast should be accomplished as soon after project completion as possible or, at a minimum, within the first year.

**Modification (M)**

Reduction in form, line, color, and texture contrast should be accomplished in the first year or, at a minimum, should meet existing regional guidelines.

**Maximum Modification (MM)**

Reduction of contrast should be accomplished within 5 years.

**DEGREE OF CONTRAST**

For purposes of this project, the contrasts for each VQO should not exceed the parameters established for the following comparable VRM Classes:

| FS VQO's | BLM VRM CLASSES |
|---|---|
| Preservation (P) | Class 1 |
| Retention (R) | Class 2 |
| Partial Retention (PR) | Class 3 |
| Modification (M) and Maximum Modification (MM) | Class 4 |
| Unacceptable Modification (UM) | Class 5 |

Specific contrasts in form, line, color, and texture indicate problems that could require design mitigation. Applying design procedures to the proposed action could eliminate or reduce visual contrasts to meet the visual planning objectives stipulated in the VRM class designations. If this were done, the project would be reassessed to determine if it could meet the area's visual goals and if not, to what degree the landscape's visual resource would be affected.

# Appendix J

# Livestock Grazing

## Livestock Grazing

Livestock grazing is probably the largest consumptive use of the lands that would be affected by the proposed project, alternatives, and variations.

Cattle, sheep, and horses graze on small family farms that run a few animals to supply dairy and meat products for the family, market, and privately owned land. Many family operations depend upon state and Federal lands to support their livestock operation. BLM lands are grazed primarily in late fall, winter, or spring; FS lands are grazed during the summer.

Many livestock operations depend upon the Federal leases to enable them to graze a sufficient number of animals to establish an economic ranch operation. As as result, all lands suitable for grazing are currently owned or leased.

Grazing capacity is extremely variable. Productivity is correlated to vegetation types, which in turn reflect different climatic and geographic zones. The capacity varies from 1 acre per animal unit month (AUM) in meadow and high precipitation areas, to 60 acres per AUM in the hot, dry desert areas. Private lands vary from 4 to 5 AUM's per acre on irrigated pastures, to 15 acres per AUM in northern areas, and 40 to 60 acres per AUM on privately owned desert lands.

FS lands are the better range lands with carrying capacities ranging from 2 acres per AUM on meadow and upper elevations, to 30 acres per AUM at lower elevations near the forest boundaries. The lands administered by BLM generally include lower elevations, low rainfall, and poor soil areas where carrying capacities range from 10 to 60 acres per AUM. However, small acres of better range do exist on BLM lands in meadows, along streams, and in some higher elevations.

Grazing fees on private lands vary according to ownership and leasing arrangements. According to the Farm Real Estate Market Development, the western states' average rate is $7.56 per AUM. Federal grazing fees (rates) based on current market value, are set by law and are subject to increase or decrease. The fees for the 1980 grazing season were $2.11 on BLM lands and $2.54 on FS lands.

## Consequences to Livestock Grazing

Grazing capacity is a product of plant growth translated into forage production and carrying capacity through inventory and analysis. Since each acre of ground may vary greatly in carrying capacity, average figures are used for the route or ownership. Table J-1 assesses impacts to livestock grazing.

Grazing capacity would be totally lost during construction of the project. Recovery of forage, with resulting restoration of grazing capacity, would result at a rate corresponding to geographic location and degree of reseeding or restoration practices employed. Average loss of forage would vary from approximately 2 to 5 AUM's per mile of construction, an average annual loss of $8.50 in grazing fees per mile. The length of this loss would depend on successful establishment of vegetation. Loss could be temporary (for 1 or more years) or total. The northern areas of the routes through Idaho and northern Utah would fall into the more productive locations, and grazing capacity would recover within 3 to 5 years. Along the southern protions of the routes in Utah, Nevada, and California, 5 to 25 years would be required to reestablish forage species, depending upon precipitation quantities and timing.

Noxious weeds have a tendency to dominate disturbed areas where precipitation ranges between 8 to 14 inches annually. If reclamation measures were not vigorously applied, weed species could dominate the area making it unsuitable for grazing for a decade or more. Several FS areas would also suffer from invasion of thistle species on disturbed areas.

Impact upon livestock grazing might be locally significant because of the linear nature of the project. Rapid construction schedules and proposed construction techniques would minimize disturbance to livestock.

The following impacts to grazing lands could occur:

Disruption of trailing patterns to and from water, should construction occur between grazing areas and water sources.

Creation of hazards in small pastures or near traditional cattle or sheep trails.

Deviation from normal sheep trailing areas or authorized trails.

Imbalance of grazing use in intensively managed grazing systems.
Rehabilitation difficulty compounded as a result of pipeline being used as a livestock trail.
Establishment of noxious weed species during construction and land clearing.
Separation of forage from livestock watering areas, especially while pipeline right-of-way is fenced for 3 to 5 years or longer to permit vegetation establishment. This might result in total removal of livestock within a grazing allotment.
Areas separated by right-of-way during construction and rehabilitation might split National Forest grazing allotments so that current management plans would not work. Added to other impacts--i.e., timber sales, Central Utah Project, Moon Lake Electric, etc.,--this might prevent the allotment from being a viable grazing unit and require livestock removal.
Economic loss to ranches might be sufficient to eliminate profit, resulting in the ranch going out of business. For instance, if an entire area was grazed by sheep, there would be a loss of 964 AUM's at 5 sheep months per AUM, 4,820 sheep months or 144,600 sheep days would be lost. 21 90 6

TABLE J-1

COMPARISON OF LOSS OF GRAZING USE FROM PIPELINE CONSTRUCTION ON THE PROPOSED ACTION, ALTERNATIVES, AND VARIATIONS

| ROUTE | LAND STATUS | | | | | | | | | | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | [a]Private | | | [b]State | | | FS | | | BLM | | | Acres | AUM | $ |
| | [c]Acres | [d]AUM | [e]$ | Acres | AUM | $ | Acres | AUM | $ | Acres | AUM | $ | | | |
| Proposed Action ..... | 2,460 | 492 | 3,719 | 11 | 1 | 7 | 642 | 214 | 543 | 3,090 | 257 | 607 | 6,203 | 964 | 4,896 |
| Northern Systems.... | 1,330 | 305 | 2,324 | 36 | 5 | 38 | -- | -- | -- | 2,650 | 265 | 673 | 4,016 | 575 | 3,035 |
| Sanpete Valley..... | 1,917 | 383 | 2,895 | 194 | 38 | 287 | 642 | 214 | 543 | 3,333 | 222 | 524 | 6,086 | 857 | 4,249 |
| Central Nevada..... | 2,753 | 550 | 4,158 | 194 | 38 | 287 | 666 | 222 | 564 | 5,514 | 367 | 866 | 9,127 | 1,519 | 5,875 |
| Sevier-Escalante Desert..... | 1,674 | 335 | 2,683 | 339 | 67 | 506 | 642 | 214 | 543 | 3,454 | 230 | 542 | 6,109 | 846 | 4,274 |
| West Salt Lake..... | 3,000 | 330 | 2,494 | 200 | 15 | 113 | 120 | 24 | 61 | 4,605 | 230 | 544 | 3,454 | 599 | 3,212 |
| Provo Canyon..... | 3,705 | 741 | 5,601 | 218 | 43 | 325 | 169 | 56 | 142 | 3,151 | 210 | 495 | 7,243 | 1,050 | 6,563 |
| Thistle Creek ..... | 290 | 58 | 438 | 12 | 2 | 15 | 24 | 8 | 20 | -- | -- | -- | 326 | 68 | 473 |
| East Las Vegas..... | 230 | 46 | 347 | -- | -- | -- | -- | -- | -- | 472 | 31 | 73 | 702 | 77 | 420 |
| Fort Mojave ..... | 12 | -- | -- | -- | -- | -- | -- | -- | -- | 108 | 5 | 12 | 120 | 5 | 12 |
| Mill Creek..... | 36 | 7 | 52 | -- | -- | -- | 120 | 40 | 101 | -- | -- | -- | 156 | 47 | 153 |
| Daniels Canyon..... | 12 | 3 | 21 | 24 | 4 | 30 | 388 | 75 | 190 | 145 | 10 | 23 | 569 | 92 | 264 |

[a]Private range land was computed as the difference of total private land less croplands.

[b]State lands do not include croplands.

[c]Acres reflect land area within the 100-foot wide right-of-way suitable for grazing.

[d]AUM's is defined as the amount of forage necessary to sustain one animal unit for 1 month.

[e]Value is computed as fees charged times AUM's; BLM=$2.36; FS=$2.54; private=$7.56. (dollars/year).

# Appendix K

# National Forest Products

The following two tables summarize commercial timber and miscellaneous forest products in National Forests which would be affected by the RMPP or its alternatives. The information should provide an adequate basis for evaluating impact to these resources.

The volumes of pinyon-juniper fuel wood in National Forests vary from 5 to 7 cords per acre west of Delta, Utah. Near Sacramento Pass and near Ely, Nevada, the volume is 9 to 10 cords per acre; in the valley bottoms, it drops to 3 cords per acre. Therefore, a good average would be 5 cords per acre.

Fees for fuel wood are $2 per cord for a personal permit, $6 for a commercial permit, and $25 for retail sale. Retail values in Las Vegas and Salt Lake City are $90 to $100 per cord. Retail values in Denver are $125 per cord.

TABLE K-1

NATIONAL FOREST RESOURCES DISTURBED BY CONSTRUCTION OF RMPP AND ALTERNATIVES

(100-foot Wide Construction Right-of-way)

| Route | Commerical Timber | | Miscellaneous Forest Products[b] | |
|---|---|---|---|---|
| | Volume (Mbf)[a] | Value($) | Volume[b] | Value($) |
| Proposed Action | 1,016 | 16,115 | 2,410 CDS<br>300 CT<br>130 P | 6,648 |
| Central Nevada Alternative | --- | --- | 375 CDS | 714 |
| West Salt Lake Alternative | 42 | 875 | --- | --- |
| Mill Creek Variation | 1,167 | 25,685 | 98 CDS | 254 |

[a]Mbf=Thousand board feet

[b]CDS=Cords of fuelwood;
CT=Christmas trees;
P=Posts

TABLE K-2

NATIONAL FOREST RESOURCES DISTURBED ANNUALLY BY OPERATION OF RMPP AND ALTERNATIVES

(50-foot Wide Permanent Right-of-way)

| Route | Commercial Timber | | Miscellaneous Forest Products[b] | |
|---|---|---|---|---|
| | Volume (Mbf)[a] | Value($) | Volume[b] | Value($) |
| Proposed Action | 106.1 | 2,211 | 95 CDS | 233 |
| Central Nevada Alternative | --- | --- | 7 CDS | 14 |
| West Salt Lake Alternative | 0.7 | 15 | --- | --- |
| Mill Creek Variation | 89.0 | 1,267 | 4 CDS | 11 |

[a]Mbf=Thousand board feet

[b]CDS=Cords of fuelwood;
CT=Christmas trees;
P=Posts

# Appendix L

# Significant Cultural Resources

TABLE L-1

SIGNIFICANT CULTURAL RESOURCES: PROPERTIES AND DISTRICTS LISTED ON THE NATIONAL REGISTER OF HISTORIC PLACES

| County | Property or District | Nearest MP |
|---|---|---|
| **Proposed Action** | | |
| Summit | Howe Flume Historic District | 100 |
| Summit | Kimball Stage Stop | 105 |
| Juab | Nephi Mounds | 196 |
| Millard | Pharo Village | 230 |
| Beaver | Wildhorse Canyon Obsidian Quarry | 300 |
| Washington | Mountain Meadows Historic Site | 379 |
| Clark | Black Dog Mesa | 461 |
| Clark | Gypsum Cave | 490 |
| Clark | Las Vegas Historic District | 500 |
| Clark | Las Vegas Wash Archaeological District | 500 |
| San Bernardino | Piute Pass Archaeological District | 597 |
| San Bernardino | Tule Springs Archaeological Site | 600 |
| **Alternative A, Northern Systems Alternative** | | |
| San Joaquin | San Luis Gonzaga Archaeological District | 25 (Brentwood-Panoche Junction Pipeline) |
| **Alternative B, Sanpete Valley Alternative** | | |
| Summit | Howe Flume Historic District | 100 |
| Summit | IKimball Stage Stop | 105 |
| Sanpete | Wasatch Academy | 17 |
| Sevier | Aspen--Cloud Rockshelters | 60 |
| Sevier | Jenson, Jens Larson Lime Kiln | 80 |
| Sevier | Parker, Joseph William, Farm | 90 |
| Washington | Mountain Meadows Historic Site | 379 |
| Clark | Black Dog Mesa | 461 |
| Clark | Gypsum Cave | 490 |
| Clark | Las Vegas Historic District | 500 |
| Clark | Las Vegas Wash Archaeological District | 500 |
| San Bernardino | Piute Pass Archaeological District | 597 |
| San Bernardino | Tule Springs Archaeological Site | 600 |

TABLE L-1—Continued

| County | Property or District | Nearest MP |
|---|---|---|
| **Alternative C, Central Nevada Alternative** | | |
| Summit | Howe Flume Historic District | 100 |
| Summit | Kimball Stage Stop | 105 |
| Juab | Nephi Mounds | 0 |
| Millard | Topaz War Relocation Center Site | 59 |
| Millard | Gunnison Massacre Site | 61 |
| Millard | Archaeological Site 42MD300 | 75 |
| White Pine | Lehman Orchard and Aqueduct | 142 |
| White Pine | Rhodes Cabin (No. 19) | 142 |
| White Pine | Ward Charcoal Ovens | 200 |
| Nye | Tonopah Historic District | 357 |
| Inyo | Pawona Witu | 465 |
| Inyo | Manzanar War Relocation Center | 505 |
| Inyo | Coso Hot Springs | 560 |
| Inyo | Big and Little Petroglyph Canyons | 570 |
| San Bernardino | Steam Well Petroglyph Archaeological District | 610 |
| **Alternative D, Sevier-Escalante Desert Alternative** | | |
| Summit | Howe Flume Historic District | 100 |
| Summit | Kimball Stage Stop | 105 |
| Juab | Nephi Mounds | 0 |
| Millard | Fort Deseret | 60 |
| Millard | Gunnison Massacre Site | 60 |
| Washington | Mountain Meadows Historic Site | 379 |
| Clark | Black Dog Mesa | 461 |
| Clark | Gypsum Cave | 490 |
| Clark | Las Vegas Historic District | 500 |
| Clark | Las Vegas Wash Archaeological District | 500 |
| San Bernardino | Piute Pass Archaeological District | 597 |
| San Bernardino | Tule Springs Archaeological Site | 600 |
| **Alternative E, West Salt Lake Alternative** | | |
| Box Elder | Hogup Cave | 150 |
| Tooele | Gapa Launch Site and Blockhouse | 225 |
| Tooele | Iosepa-Settlement Cemetary | 270 |
| Beaver | Wildhorse Canyon Obsidian Quarry | 300 |
| Washington | Mountain Meadows Historic Site | 379 |
| Clark | Black Dog Mesa | 461 |
| Clark | Gypsum Cave | 490 |
| Clark | Las Vegas Historic District | 500 |
| Clark | Las Vegas Wash Archaeological District | 500 |
| San Bernardino | Piute Pass Archaeological District | 597 |
| San Bernardino | Tule Springs Archaeological Site | 600 |
| **Alternative F, Provo Canyon Alternative** | | |
| Summit | Howe Flume Historic District | 100 |
| Summit | Kimball Stage Stop | 105 |
| Utah | Olmsted Station Powerhouse | 30 |

TABLE L-1—Continued

| County | Property or District | Nearest MP |
|---|---|---|
| Utah | Old Goshen | 80 |
| Millard | Pharo Village | 230 |
| Beaver | Wildhorse Canyon Obsidian Quarry | 300 |
| Washington | Mountain Meadows Historic Site | 379 |
| Clark | Black Dog Mesa | 461 |
| Clark | Gypsum Cave | 490 |
| Clark | Las Vegas Historic District | 500 |
| Clark | Las Vegas Wash Archaeological District | 500 |
| San Bernardino | Piute Pass Archaeological District | 597 |
| San Bernardino | Tule Springs Archaeological Site | 600 |
| **Variation 3, East Las Vegas Variation** | | |
| Clark | Big Spring | 12 |
| **Variation 4, Fort Mojave Variation** | | |
| Clark | Dead Mountains Archaeological District | 5 |

*U S GOVERNMENT PRINTING OFFICE: 1981 349-479/8531

# PUBLIC HEARINGS REGISTRATION FORM

For public hearings on the draft RMPP Natural Gas Pipeline Environmental Impact Statement.

(Please Print)

To: Janis L. Bowles, Office of Special Projects, 3rd Floor East, 555 Zang Street, Denver, Colorado 80228

From: Name _____

Street Address _____

City, State _____ Zip Code _____

Representing _____

I wish to appear at the _____ public hearing on _____
(town)

1981, afternoon ( ) evening session ( ) to express my views on the adequacy of the EIS.

I intend to submit written documentation: Yes _____ No _____

_____
Signature

Verbal testimony will be limited to 10 minutes; written testimony will be accepted at the above address until close of business on August 1, 1981. Registration forms are to be submitted by July 1, 1981. Registration will also be accepted at the door for each hearing.

Card

Pipeline Project Draft Environ-
tatement

MANAGEMENT;USDI
) pages apprx.

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